

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Permitting and Compliance Division

MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES)

Permit Fact Sheet

Permittee: Stillwater Mining Company

Permit No.: MT0026808

Receiving Waters: East Boulder River and Alluvial Ground Water

Facility Information

Name: Stillwater East Boulder Mine
McLeod, MT

Contact: Matt Wolfe, Environmental Supervisor

County: Sweetgrass

Fee Information

Major/Minor: Minor

Type: Private Minor

Number of Outfalls: 3 (for fee determination only)

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1 BACKGROUND

This fact sheet identifies the principal facts, and significant factual, legal, methodological, and policy issues considered in preparing a draft permit in accordance with Administrative Rules of Montana (ARM) 17.30.1371. A fact sheet is prepared for any draft permit that establishes new or amended effluent limitations or standards, schedules of compliance, variances, nonsignificance determinations under ARM 17.30.706, denial or granting of mixing zones under ARM 17.30.515, or other significant requirements.

Stillwater Mining Company (hereinafter Permittee) is the owner and operator of the Stillwater East Boulder Mine (hereinafter Facility), an underground platinum and palladium mine.

In this permit and fact sheet, references to the “discharger” or “Permittee” in applicable federal and state laws, regulations, policy, plans, or implementation procedures are held to be equivalent to references to the Permittee in the permit and fact sheet.

Montana has adopted a number of federal regulations by reference which are cited in this permit as a basis for permit limits. Reference to “director” or “state director” in these federal regulations means the Department of Environmental Quality (DEQ) as defined in ARM 17.30.1322 when these references are to a delegated or approved NPDES state program, otherwise, it refers to the Regional Administrator.

1.1 Permit and Application Information

The Facility was originally granted a Montana Pollutant Discharge Elimination System (MPDES) permit in 1988. Operations commenced in 1999, and the Facility first discharged in 2000. The current MPDES permit became effective on August 1, 2000, and expired on July 31, 2005 (2000 permit). The Permittee submitted an application for renewal of the Facility’s MPDES permit dated January 31, 2005 (2005 application). The application was determined to be complete on April 10, 2008.

The Permittee submitted additional material on May 5, 2014, November 11, 2014, March 27, 2015, and March 30, 2015.

The terms and conditions of the 2000 MPDES permit have been administratively continued and remain in effect until a new permit is issued.

1.2 Description of Facility and Discharges

This MPDES permit regulates point sources from the Facility that discharge pollutants into state waters, as described below. This permit is issued pursuant to ARM Title 17 Chapter 30, Subchapter 13 to regulate and protect state surface waters.

The discharge of pollutants to state waters from point sources is limited to outfalls authorized in the Facility’s discharge permit.

1.2.1 Description and Location of Facility

The Permittee owns and operates an underground platinum and palladium mine with an associated mill and lined tailings impoundment. The mine is located approximately 32 miles southeast of Big Timber, Montana, in Sweet Grass County. The mine facilities are located within a 977-acre operating permit area and also include a concentrator building, a shop and warehouse, changing facilities, storage facilities, office, water treatment system, and several land application sites.

Sources of wastewater at the Facility include adit water which is ground water that has infiltrated the underground mine workings, sanitary wastewater discharged to a drainfield, and storm water that infiltrates or runs off. The Facility employs a grouting program to limit the amount of ground water inflow to the underground workings. Any process wastewater from the concentrator (froth floatation) mill is directed to the tailings impoundment and no discharge from the tailings impoundment is authorized by this or any previous MPDES permit. Under current operations, most mine adit water is returned to the underground workings for reuse after treatment.

1.2.2 Wastewater Treatment or Controls

Wastewater treatment of mine adit water at the Facility consists of clarification followed by anoxic biological treatment. Mine adit water is also reused in underground workings for drilling and other mine-related purposes.

The anoxic biological treatment system is composed of fixed and fluid bed bioreactor cells for nitrification of ammonia prior to reuse or discharge. The Permittee installed a heat exchanger system upstream of the treatment cells to improve treatment during the winter months and also installed a reverse osmosis treatment system for redundancy in the case of a biological treatment system failure. In addition, Stillwater has budgeted for additional control technology upgrades in 2015, including the potential installation of a 10-micron filter at the end of treatment, prior to discharge [Conversation with Matt Wolfe, July 13, 2015].

Table 1 summarizes the sources of wastewater at the East Boulder Mine.

Table 1. Sources of wastewater contributing to each outfall

Outfall	Description	Average Flow (gallons per minute, gpm)	Intermittent (Y/N)
001/002	Adit Inflow	500	N
003	Sanitary Sewer	4	N

The permit limits developed for Outfalls 001 and 002 in this permit renewal were individually analyzed, and each were based on the assumption that all of the reported adit wastewater currently discharged from Outfall 002 would be discharged from either respective outfall. DEQ has presumed that the sum total of wastewater discharged from the Facility will not increase above 500 gpm regardless of which outfall (001 or 002), or a combination of both, is used.

The permit application also describes alternate wastewater disposal sites including snowmaking and irrigation. The application refers to these areas as LAD (land application and disposal) sites. According to supplemental information provided by the Permittee, these sites may provide additional nitrogen removal through biological denitrification and evaporation or volatilization of pollutants. **Section 4.2** describes best management practices for land application sites.

1.2.3 Discharge Points

The Permittee discharges from the treatment system described in **Section 1.2.2** into state waters at the locations identified in **Table 2**. By definition, state waters are any surface or underground body of water, irrigation system or drainage system. Ponds, lagoons, or other waste impoundments used solely for treating, impounding, or transporting wastes are not state waters. Discharge to state waters is prohibited unless expressly authorized in the Facility's discharge permit.

Authorization of discharge through Outfall 001 is based on the assumption that a properly designed and constructed diffuser will be installed and nearly instantaneous mixing will occur in the receiving water. There is currently no discharge at Outfall 001. No direct discharge to surface water is allowed until a diffuser is reviewed and approved by DEQ.

Authorization of discharge through Outfalls 002 and 003 are based on protection of the East Boulder River.

Table 2. MT0026808 discharge locations

Outfall	Latitude	Longitude	Receiving Water	Receiving Water Classification
001	45° 30' 44" N	110° 05' 14" W	East Boulder River	B-1
002	45° 30' 16" N	110° 05' 06" W	Ground Water/East Boulder River	Class I / B-1
003	45° 30' 11" N	110° 05' 06" W	Ground Water/East Boulder River	Class I / B-1

The beneficial use classifications and applicable water quality standards for the receiving water are identified in **Section 2**.

1.2.4 Permit Fee Determinations

The Montana Water Quality Act requires that permit fees be assessed that are sufficient to cover the cost administering the permit program (75-5-516, MCA). Permit fees are based on the type of waste (sewage, process wastewater, storm water, noncontact cooling water, etc.) and receiving water or stream segment. An application and annual fee for multiple outfalls is not required unless the discharges are to different receiving waters or result in multiple or variable effluent limits. **Table 3** identifies, individually or by group, the type of wastewater and receiving water by outfall for which effluent limits will be required.

Table 3. Summary outfall categories for fee purposes

Group	Effluent Description	Receiving Water	Outfalls
A	Mine Drainage	East Boulder River	001
B	Mine Drainage	Ground Water/East Boulder River	002
C	Domestic Sewage	Ground Water/East Boulder River	003

1.2.5 Effluent Characteristics

Appendix 3 provides a summary of effluent characteristics provided by the Permittee. Outfall 001 has not yet been constructed and no actual discharges have occurred at Outfall 001 during the term of the existing permit. Outfall 002 data represents the quality of treated adit water and wastewater that would be discharged at Outfall 001. In addition, no direct monitoring of the treated effluent from the sanitary sewer (Outfall 003) was conducted and therefore no actual effluent quality is available.

The existing permit requires that the Facility conduct acute toxicity testing quarterly when discharging at Outfall 001. Because there have been no discharges at Outfall 001, no toxicity results are reported.

The discharge authorized at Outfall 001 is a direct discharge to the East Boulder River; however, a discharge conveyance structure has not yet been constructed by the Permittee. For the purposes of developing a permit, the flow data reported for Outfall 001 is a potential flow based on discharges at Outfall 002. The discharge at Outfall 002 is to percolation ponds that infiltrate to alluvial ground water associated with the East Boulder River. Depth to ground water varies from 25 to 110 feet below ground surface in the vicinity of the Facility. Discharge Monitoring Report (DMR) data from the period of record of May 2005 through May 2015 shows a maximum discharge rate at Outfall 002 of 705 gpm and an average of 111 gpm.

1.2.6 Planned Changes

According to the application, no improvements or changes in operation are proposed other than a potential upgrade to the treatment technologies.

1.2.7 Other Information

The Facility has a mine operating permit (#00149). The permit application does not identify any other environmental permits that are applicable to the Facility.

DEQ records indicate that the Permittee is authorized to discharge storm water under DEQ's general permit number MTR000000 for industrial storm water. Authorization MTR000503 (formerly MTR300226) lists three storm water outfalls that discharge to the East Boulder River.

1.3 Compliance Summary

Data and information submitted to, or collected by, DEQ indicate that the Permittee has exceeded existing effluent limitations or failed to comply with other existing permit requirements as outlined below.

A mixing zone was authorized in the 2000 permit for discharge of treated wastewater from Outfall 002 to ground water. The Permittee has been monitoring ground water concentrations to demonstrate compliance with the requirement to maintain total inorganic nitrogen to below 7.5 mg/L at the end of the mixing zone. Compliance monitoring occurs at ground water monitoring wells MW-2, MW-3, MW-6, MW-7, MW-8, and MW-9, which are located at the edge of the mixing zone for Outfall 002 (see Figure 1). Monitoring results have demonstrated an increasing trend in nitrogen concentrations in ground water since 2000.

DEQ has issued quarterly violation letters since 2008 for violation of the inorganic nitrogen limit in the existing permit for MW-2, MW-6, and MW-7. DEQ and Permittee signed an Administrative Order on Consent (AOC), August 6, 2010, which specified, among other items, corrective actions that must be undertaken by the Permittee to address these violations. The Permittee implemented a study and submitted a report that investigated the source of the increase in nitrogen. The Permittee conducted and summarized the results of an investigation of the increase of nitrogen in ground water in a report titled "Stillwater Mining Company Nitrogen Concentration Increase Phenomena at East Boulder Mine and Summary of Affirmative Actions by Company," dated February 9, 2010. The conclusion from this study was that nitrogen that has been sorbed to, and retained in, soils has been leached to ground water because of seasonal storm water runoff and fluctuating ground water levels.

To mitigate ground water concentrations of nitrogen, the Permittee has removed fine-grained sediment from the percolation pond to remove any sorbed nitrogen that may leach to ground water, has replaced MW-4 with a new deeper well for better characterization of nitrogen flushing from beneath the percolation pond, and has installed two in-situ treatment wells through which methanol is injected to foster biological denitrification.

With this renewal, DEQ has removed the 7.5 mg/L total inorganic nitrogen compliance limit at the end of the mixing zone, and replaced it with end-of-pipe effluent limits for nitrate+nitrite at the request of the Permittee. The ground water monitoring for total inorganic nitrogen has been retained as a Special Condition.

Compliance Evaluation Inspections were conducted on August 24, 2005, June 18, 2010, and December 13, 2013. No permit violations were observed during these inspections.

2 EFFLUENT LIMITATIONS

The Montana Water Quality Act requires that DEQ specify in the permit any limitations imposed on the volume, strength, and other significant characteristics of the waste to be discharged. The control of pollutants discharged is established through effluent limitations and other requirements in the permit. There are two principal bases for effluent limitations: technology-based effluent limitations (TBELs) that specify the minimum level of treatment or control for conventional, non-conventional, and toxic pollutants and water quality-based effluent limitations (WQBELs) that attain and maintain applicable numeric and narrative water quality standards. The federal regulation at 40 CFR 122.44(a)(1) (incorporated into ARM 17.30.1344(2)(b) by reference) requires that MPDES permits include conditions that meet all applicable TBELs, at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. Effluent limitations in Section 2 of the permit represent the standards and limitations that are applicable to discharges from the Facility.

2.1 Technology-based Effluent Limitations (TBELs)

Section 402(a)(1) of the federal Clean Water Act (CWA) and the federal regulations at 40 Code of Federal Regulations (CFR) 125.3(a) require that permits issued under section 402, including those issued by state programs, contain TBELs that implement the technology-based treatment requirements specified in the CWA. These technology-based requirements may be national technology standards for

existing sources or new sources established by EPA or, in some cases, standards established by the permit writer on a case-by-case basis. TBELs are required to be applied to each point source discharge. ARM 17.30.1203. TBELs are applied prior to or at the point of discharge. ARM 17.30.1203(7).

2.1.1 Scope and Authority

EPA has promulgated national TBEL and standards of performance for both existing and new sources at 40 CFR Subchapter N. These effluent limitations and standards are more commonly referred to as “effluent guidelines.” EPA promulgates effluent guidelines under the authority of Sections 301, 304, 306, 307, 308, 402, and 501 of the CWA. The Board of Environmental Review (Board) has adopted effluent limitations and standards, toxic effluent standards and new source performance standards in ARM 17.30.1203, 1206 and 1207, respectively, based on the applicable federal regulation. These regulations require that all discharges require, at minimum, the following level of treatment:

- Best practicable treatment control technology (BPT) which represents the average of the best performance by plants within an industrial category or subcategory. BPT standards apply to toxic, conventional, and non-conventional pollutants discharged by an existing discharge or new discharge that is not a new source.
- Best available technology economically achievable (BAT) represents the best existing performance of treatment technologies that are economically achievable within an industrial point source category. BAT standards apply to toxic and non-conventional pollutants discharged by an existing discharge or new discharge that is not a new source.
- Best conventional pollutant control technology (BCT) represents the control of conventional pollutants including biological oxygen demand (BOD), total suspended solids (TSS), fecal coliform, pH, and oil and grease in an existing discharge or new discharge that is not a new source. The BCT standard is established after considering the “cost reasonableness” of the relationship between the cost of attaining a reduction in effluent discharge and the benefits that would result, and the cost effectiveness of additional industrial treatment beyond BPT.
- New source performance standards (NSPS) represent the best available demonstrated control technology standards. The intent of NSPS guidelines is to set limitations that represent state-of-the-art treatment technology for new sources. A source is a new source if it meets the definition of new source in ARM 17.30.1304(47) and 1340(1) and a new source performance standard is independently applicable to it. If there is no such independently applicable standard, the source is a new discharger [ARM 17.30.1340(2)]. A source is an existing source if it is not a new source or a new discharger. For purposes of applying effluent guidelines, the existing sources standards (BPT, BCT, and BAT) apply to existing sources and new dischargers. NSPS apply to new sources.

Finally, permit limitations, standards and prohibitions must be established for each outfall or discharge point of the permitted facility, except that best management practices may be imposed under 40 CFR 122.44(k) to control or abate pollution, including: 1) as authorized under section 304(e) of the federal CWA for the control of toxic pollutants from ancillary industrial activities; 2) as authorized under section 402(p) of the federal CWA for the control of (municipal) storm water; 3) when numeric effluent limitation are infeasible; or 4) when the practices are reasonably necessary to achieve effluent limitations or standards or to carry out the purposes and intent of the CWA.

2.1.2 Additional Requirements

Any permit limitations, standards, or other prohibitions which are based on units of production (or other measure of operation) be based on a reasonable measure of actual production of the Facility and not on the designed production capacity. The permit may include a condition establishing alternative permit limitations, standards, or prohibitions based upon anticipated increased or decreased production levels, however, these alternate limits may not exceed maximum production capacity. In calculating alternative permit limitations, the permit must satisfy the requirements of ARM 17.30.1345(4).

All permit effluent limitations, standards or prohibitions for a metal must be expressed as total recoverable metal as defined in 40 CFR 136 unless: 1) the applicable effluent standard or limitation has been expressed in another form; 2) in establishing permit limits on a case-by-case basis under 40 CFR 125.3 (ARM 17.30.1203); or 3) the approved method for the metal only measures the dissolved form (e.g. hexavalent chromium). ARM 17.30.1345(5).

For continuous discharges, all permit effluent limitations, standards, and prohibitions must, unless impracticable, be stated as maximum daily and average monthly discharge limitations for all dischargers other than publicly-owned treatment works (POTWs). ARM 17.30.1345(6).

Dischargers that are not continuous must be particularly described and limited, considering, as appropriate, frequency, total mass, maximum rate of discharge of pollutants during the discharge, and prohibition or limitations of specified pollutants by mass, concentration, or other appropriate measure. ARM 17.30.1345(7).

All pollutants limited in permits must have limitations, standards, or prohibitions expressed in terms of mass except for: pH, temperature, radiation, or other pollutants that cannot be appropriately expressed by mass; when applicable standards and limitations are expressed in terms of other units of measurement; or if in establishing limitations on a case-by-case basis, limitations expressed in terms of mass are infeasible because the mass of the pollutant discharged cannot be related to a measure of operation. ARM 17.30.1345(8).

In addition to technology-based control on wastewater dischargers, technology-based controls must be established in the permit for all solids, sludges, filter backwash and other pollutants removed in the courses of treatment or control of wastewaters in the in the same manner as specified for other pollutants (BPT, BCT, BAT or where applicable NSPS). ARM 17.30.1203.

2.1.3 Applicable Federal Effluent Limit Guidelines

EPA has promulgated effluent guidelines in 40 CFR Part 440, Subpart K for facilities in the Ore Mining and Dressing Point Source Category, Platinum Ores Subcategory. These effluent guidelines are found at 40 CFR §§ 440.110 – 440.115 and Subpart L found at 40 CFR §§ 440.130 – 440.132. The guidelines address mines that produce platinum ores and mills that process platinum ores. The Facility uses the froth flotation process to concentrate metals from platinum ores. However, the Facility directs all process wastewater from froth flotation to a tailings impoundment. Since there is no discharge, this process (froth flotation) is not subject to CFR 440.113(b).

The general definitions given in 40 CFR 440.132 are incorporated by reference into this fact sheet and will be included in the permit.

Outfalls 001 and 002

The new source date for the effluent guidelines for the Ore Mining and Dressing Point Source Category is December 3, 1982. Although the Facility began construction after this date, the NSPS requirements at 40 CFR 440.114 are reserved. Therefore, BPT, BCT, and BAT limitations are the applicable effluent guidelines limitations for discharges from the Facility. No BPT or BCT requirements have been promulgated in the applicable effluent guidelines.

The applicable BAT limitations from the effluent guidelines are summarized below in **Table 4**. The effluent limitations for concentration of pollutants discharged in mine drainage from mines that produce platinum bearing ores from open-pit or underground operations other than placer deposits are listed directly from 40 CR 440.113. Mine drainage means any water drained, pumped, or siphoned from a mine. 40 CFR 440.132(h).

Table 4. Effluent limitations on pollutants discharged in mine drainage from platinum bearing ores (40 CFR 440.113)

Effluent Characteristic	Units	Effluent Limitations	
		Average of daily values for 30 consecutive days	Maximum for any 1 day
Copper, Total Recoverable	mg/L	0.15	0.30
Zinc, Total Recoverable	mg/L	0.75	1.5
Lead, Total Recoverable	mg/L	0.3	0.6
Mercury, Total Recoverable	mg/L	0.001	0.002
Cadmium, Total Recoverable	mg/L	0.05	0.10

2.1.4 Case-by-Case Requirement –Outfalls 001 and 002

In addition to the pollutants identified above as technology-based limitations, the proposed permit also retains from the previous permit limitations for total suspended solids, which have been established on a case-by-case basis based on Best Professional Judgement (BPJ). The permit also establishes an effluent limitation for pH which is a conventional pollutant. The limitations are equivalent to limits for TSS and pH required by the effluent guidelines for other mining subcategories in 40 CFR Part 440.

Because the Facility employs underground mining, mine drainage accumulates solids as it passes through the underground workings. Based on the treatment system (clarification), the Facility is capable of complying with these limits for pH and TSS. The limits are summarized in **Table 5**.

Table 5. Case-by-Case Requirements for Outfalls 001 and 002

Effluent characteristic	Units	Effluent limitations	
		Average of daily values for 30 consecutive days	Maximum for any 1 day
TSS	mg/L	20	30
pH	SU	6.0 (minimum) to 9.0 (maximum)	

2.1.5 Alternative Effluent Limitations - General Provisions

The general provisions of 40 CFR 444.131(a) regarding comingled waste stream are applicable, but are not applied to this Facility because the application states that the only source contributing to Outfalls 001 and 002 is adit inflow (mine drainage). Likewise, the storm water exemptions of 40 CFR 440.131(b) are applicable to the Facility, but are not applied to any outfall regulated by this permit based on information provided in the application.

2.1.6 Production Data for Application of Effluent Guidelines

The effluent guidelines applicable to Outfall 001 and 002 are not expressed in terms of mass or other production-based limitations. The effluent limitations for this Facility will therefore be expressed in terms of concentration as given in 40 CFR 440, Subpart K.

2.1.7 Final TBELs

Table 6 summarizes the calculated TBELs for the Permittee at Outfalls 001 and 002.

Table 6. TBEL limits for Outfalls 001 and 002

Parameter	Units	Average Monthly Limitation	Maximum Daily Limitation
Copper, Total Recoverable	mg/L	0.15	0.30
Zinc, Total Recoverable	mg/L	0.75	1.5
Lead, Total Recoverable	mg/L	0.3	0.6
Mercury, Total Recoverable	mg/L	0.001	0.002
Cadmium, Total Recoverable	mg/L	0.05	0.10
Total Suspended Solids (TSS)	mg/L	20	30
pH	SU	6.0 (minimum) to 9.0 (maximum)	

2.2 Water Quality-based Effluent Limitations (WQBELs)

Section 301(b) of the CWA and 40 CFR 122.44(d), incorporated into ARM 17.30.1344(2)(b) by reference, require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. The degree of waste treatment required to restore and maintain the quality of state water shall be based on the surface water quality standards and: 1) the state's policy of nondegradation of existing water quality in 75-5-303, MCA; 2) present and anticipated (designated) uses of the receiving water; 3) the quality and nature of flow of the receiving water; 4) the quantity and quality of sewage, industrial or other wastes to be treated; and, 5) the presence or absence of other sources of pollution in the same watershed.

2.2.1 Scope and Authority

The Montana Water Quality Act at 75-5-401(2), MCA states that a permit may only be issued if DEQ finds that the issuance or continuance of the permit will not result in pollution of any state waters. Montana water quality standards require that no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. MPDES permits shall include limits on all pollutants which will cause, or have a reasonable potential to cause an excursion of any water quality standard, including narrative standards, in state surface waters.

Title 75, Part 3 of the Montana Water Quality Act, requires the Board to establish the classification of all state waters in accordance with their present and future most beneficial uses; to formulate and adopt standards of water quality, giving consideration to the economics of waste treatment and prevention; adopt rules implementing the state's nondegradation policy; and adopt rules governing mixing zones. The Montana Surface Water Quality Standards and Procedures are found in ARM 17.30.601-670, which also includes, by reference, Circular DEQ-7 (Montana Numeric Water Quality Standards). Montana's regulations on Nondegradation of Water Quality are in ARM 17.30.701-718 and regulations on Mixing Zones in Surface and Ground Water are in ARM 17.30.501-518.

On July 25, 2014, the Board and DEQ adopted new rules governing nutrients for surface waters including adoption of Circular DEQ-12A (Montana Base Numeric Nutrient Standards) and DEQ-12B (Nutrient Standard Variances). These standards and corresponding variance procedures apply to total nitrogen and total phosphorus.

ARM 17.30.603 states that the standards in Subchapter 6 are adopted to establish maximum allowable changes in surface water quality and to establish a basis for limiting the discharge of pollutants to surface waters. ARM 17.30.620 states that the specific water quality standards along with the general provision of ARM 17.30.635-637, 17.30.641, 17.30.645, and 17.30.646 protect the beneficial uses set forth in the water-use classifications.

2.2.2 Applicable Water Quality Standards

The specific standards are given in ARM 17.30.621-629 and incorporate, by reference, DEQ Circular DEQ-7 which contains numeric water quality standards for protection of aquatic life and human health, and DEQ-12A which contain numeric nutrient standards.

ARM 17.30.637(1) requires that state waters must be free from substances which will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and (e) create conditions which produce undesirable aquatic life.

Effluent limitations based on the narrative prohibition of substances that will cause toxicity in state surface water are known as Whole Effluent Toxicity (WET) tests. These methods may also be used to develop a no observed effects levels for pollutants regulated by narrative standards. WET requirements are discussed in **Section 2.2.8** and **2.2.10**.

For new sources discharging to high quality waters, effluent limitation for numeric and narrative standards are modified by the criteria in ARM 17.30.715. These criteria are based on the protection of existing water quality and protection of assimilative capacity.

Appendix 1 provides a summary of water quality standards and the applicable nondegradation criteria for the affected receiving waters.

Water Use Classification and Standards

Outfall 001 discharges directly to the East Boulder River, a tributary to the Boulder River, which is located within the Upper Yellowstone watershed. This watershed is located in USGS Hydrological Unit Code (HUC) 10070002. The East Boulder River is identified as Montana stream assessment unit MT43B004_143. The designated water-use classification for the East Boulder River is B-1 as summarized in **Table 7**.

Outfall 002 discharges mine wastewater into percolation ponds that infiltrate wastewater to ground water below the mine site and adjacent to the East Boulder River. Ground water in the vicinity of the percolation pond is up to 110 feet below the surface. Outfall 003 also discharges to ground water below the sanitary wastewater drainage field. The direction of ground water flow in the East Boulder River valley is towards the northwest following the trend of the valley (FEIS, Montana Department of State Lands, et al. 1992). The degree of hydrological connection has not been established nor has the point of discharge to the permitted receiving water, which is the East Boulder River. The water-use classification for ground water is Class I based on Montana ground water standards and is also summarized in **Table 7**. ARM 17.30.1006.

Table 7. Water Use Classification and Beneficial Uses—East Boulder River and Ground Water

Classification	Beneficial Uses
B-1	Drinking, culinary and food processing purposes after conventional treatment; Bathing, swimming, and recreation; Growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and Agricultural and industrial water supply.
I	The quality of Class I ground water must be maintained to that these waters are suitable for the following uses with little or no treatment: public and private water supplies; culinary and food processing; irrigation; livestock and wildlife; and commercial and industrial purposes.

The water quality standards and nondegradation criteria that apply to the receiving waters for each regulated outfall based on the water use classification are presented in Appendix 1.

WATER QUALITY STANDARDS NUTRIENT VARIANCE

The Board of Environmental Review adopted the Base Numeric Nutrient Standards in Department Circular DEQ-12A in August 2014. The total nitrogen (TN) and total phosphorus (TP) standards in DEQ-12A were set at levels designed to protect the beneficial uses and prevent exceedances of other surface water quality standards which are commonly linked to nitrogen and phosphorus concentrations (e.g. pH and dissolved oxygen) as well as narrative standards. Table 12A-1 in the Circular contains seasonal base numeric TN and TP for Montana's flowing waters based on ecoregion.

During development of MPDES permits, DEQ evaluates whether a facility has reasonable potential to cause or contribute to an exceedence of the nutrient standards for TN and TP. If there is reasonable potential, DEQ calculates effluent limits that would allow the surface water body to meet the standards. Circular DEQ-12A contains specific definitions for TN and TP:

- *Total nitrogen* means the sum of all nitrate, nitrite, ammonia, and organic nitrogen, as N, in an unfiltered water sample. Total nitrogen in a sample may also be determined via persulfate digestion or as the sum of total Kjeldahl nitrogen plus nitrate plus nitrite.
- *Total phosphorus* means the sum of orthophosphates, polyphosphates, and organically bound phosphates, such as P, in an unfiltered water sample. Total phosphorus may also be determined directly by persulfate digestion.

Because the numeric standards in Circular DEQ-12A, and therefore resulting effluent limits, are stringent and may be difficult for MPDES permit holders to meet in the short term, the Montana Water Quality Act (MWQA) establishes a process for granting individual, general and alternative variances. 75-5-313, MCA; ARM 17.30.660. A nutrient variance may be granted for a period not to exceed 20 years. Procedures for implementing a general variance are given in 75-5-313(5)(a), MCA and Section 2.0 of Circular DEQ-12B which includes a requirement that the Permittee conduct a wastewater facility optimization study as determined by the Permittee. Procedures granting an individual nutrient variance are given in 75-5-313(1) through (4), MCA and Section 3.0 of Circular DEQ-12B.

The Permittee has determined that the mixed bed bioreactor (MBBR) biological treatment systems at the Facility will not achieve the applicable numeric nutrient standards for the East Boulder River. Therefore, the Permittee requested a general variance for both TN and TP. The Facility currently discharges less than 1.0 million gallons per day (mgd). Based on the daily discharge volume provided by the Permittee and the nutrient variance values given in DEQ-12B, seasonal nutrient effluent limits were calculated for discharge to the East Boulder River (**Table 8**).

Table 8. Calculated Nutrient Variance Limits for East Boulder River Based on DEQ-12B

Pollutant	Nutrient Variance Monthly Average (mg/L)	Effluent Volume (mgd)	Monthly Average Limit (lbs/day)
Total Nitrogen	15.0	0.72	90
Total Phosphorus	2.0	0.72	12

The monthly average TN and TP apply seasonally, from July 1st through September 30th, for discharges from Outfall 001 directly to the East Boulder River. These limits are compared to previous limits as part of the anti-backsliding review in Section 2.3.2, and the most stringent are the proposed limits.

2.2.3 Design Conditions

Montana water quality standards state that no wastes may be discharged, either alone or in combination with other wastes, or activities that will violate or be reasonably expected to violate any of the standards. In order to establish discharge limitations in permits it is necessary to determine certain characteristics of the receiving water that are critical to the protection of designated uses and existing water quality (new sources). Both the quantity and quality of the receiving water vary daily, seasonally

and annually. Montana water quality standards establish certain critical conditions for surface water as the basis for limiting the discharge of pollutants in surface water.

CRITICAL STREAM FLOW (Q_s)

Critical stream flow is based on the requirement that discharge permits not cause receiving water concentrations to exceed applicable standards when stream flows equal or exceed the design flows specified in ARM 17.30.635(2). This rule states that the receiving water design flow for point source discharges must be based on the minimum consecutive seven day average flow which may be expected to occur, on average, once in 10 years (7Q10). If there are insufficient data to establish a 7Q10, DEQ must establish an acceptable stream flow.

Analysis conducted for the EIS estimated the 7Q10 for the East Boulder River to be 5.0 cubic feet per second (cfs) based on regression analysis. This value was used in the previous permit to establish WQBEL. Monitoring records from the East Boulder River monitoring site EBR3 have reported quarterly average values of 5.0 cfs or less on at least six occasions for the period October 2000 through December 2012. For purposes of establishing a critical flow, the 5.0 cfs will be maintained. For nutrients, effluent limitations are based on a seasonal 14Q5 (minimum consecutive 14 day average flow which may be expected to occur, on average, once in 5 years). The seasonal (July – October) 14Q5 is estimated to be 10.5 cfs using similar regression methods.

In summary, critical stream flows used for water quality assessment of discharges from the Facility are as follows:

7Q10: 5.0 cfs (= 3.23 mgd)
Seasonal 14Q5: 10.5 cfs (= 6.79 mgd)

CRITICAL BACKGROUND RECEIVING WATER POLLUTANT CONCENTRATION (C_s)

The critical pollutant concentration is the average or mean concentration expected in the receiving water during the flow period that corresponding to the critical stream flow (7Q10 or 14Q5) (See *Handbook: Stream Sampling for Waste Load Allocation Applications*, EPA/625/6-86/013, September 1986; *Technical Guidance Manual for Performing Waste Load Allocations, Book VII: Permit Averaging Period*, EPA, September 1984). Since the critical stream flow is an infrequent event, this value must be estimated based on existing water quality data that are collected at non-critical conditions. The critical receiving water pollutant concentration is not given by a single value but is estimated to be in a range defined by the first quartile (25th percentile) and third quartile (75th) percentile of the measured background data.

The background concentration is not equivalent to the natural condition of the receiving water. Background concentration is used to determine assimilative capacity and incorporates point and nonpoint activities in the watershed at the present time. Background concentrations, sources of information, and methodology are presented in Appendix 2.

The magnitude of some numeric standards is dependent on characteristics of the receiving water, such as hardness, pH, and temperature. These values are summarized in **Table 9**.

Table 9. Basis for certain numeric water quality standards

Dependent Parameter	Measured Parameter	Statistic	Value	Units
Metals	Hardness (as CaCO ₃)	25 th percentile	50	mg/L
Ammonia -- Acute	pH	75 th percentile	8.1	s.u.
Ammonia -- Chronic	pH	75 th percentile	8.1	s.u.
	Temperature	75 th percentile	5.5	°C

The numeric water quality standards applicable to East Boulder River are shown in Appendix 1 to this fact sheet.

2.2.4 Impaired Waters

The MWQA at 75-5-702, MCA, requires that DEQ monitor state waters and assess the quality of those waters to identify surface waterbodies or segments of waterbodies whose designated uses are threatened or impaired. Section 75-5-703, MCA requires that DEQ complete a Total Maximum Daily Load (TMDL) for those waterbodies that are identified as threatened or impaired. These requirements satisfy sections 303(d) and 305(b) of the federal Clean Water Act.

Upon approval of the TMDL, the wasteload allocation (WLA) developed for a point source must be incorporated into the Facility's discharge permit. Pending completion of a TMDL on a listed waterbody, a point source discharge may continue or commence provided that: 1) the discharge is in conformance with the state's nondegradation policy and rules; 2) the discharge will not cause a decline in water quality for any parameter by which the waterbody is impaired; and, 3) minimum treatment requirements are met. A WLA is defined as the portion of the receiving water's loading capacity that is allocated to an existing or future point source.

2014 303(d) List

Outfall 001 discharges directly to the East Boulder River on assessment unit MTB004_143 (headwaters to National Forest boundary), which does not have any pollutant listings on the 2014 303(d) list. The East Boulder River assessment units MTB004_141 (National Forest boundary to Elk Creek) and MTB004_142 (Elk Creek to mouth (Boulder River)) are listed as impaired on the 2014 303(d) list. MTB004_141 is listed for chlorophyll-a and flow alterations, and MTB004_142 is listed for chlorophyll-a, flow alterations, sedimentation/siltation, and other anthropogenic substrate alterations. Downstream of where the East Boulder River flows into the Boulder River, the Boulder River (MT43B004_132) is listed as impaired for chromium, copper, iron, lead, nickel, nitrite plus nitrate, and total nitrogen.

Approved TMDL

On September 11, 2009, EPA approved the TMDLs for the Boulder River watershed including the East Boulder River. The approved TMDL includes WLAs for the East Boulder Mine for copper, iron and lead. These values will be incorporated into the MPDES permit (**Table 10**).

Table 10. East Boulder River Wasteload Allocations—MT0026808 (Outfalls 001 and 002)

Parameter/Unit	Units	Aquatic Life Chronic	Aquatic Life Acute	Human Health	Basis
Copper	lbs/day	0.061	--	--	Boulder River Watershed Total Maximum Daily Loads August 31, 2009
Iron	lbs/day	28.5	--	--	
Lead	lbs/day	0.005	--	--	

These WLA are incorporated into applicable permit limits as discussed in **Section 2.2.8** of this permit fact sheet.

Ground Water Assessment

Outfall 002 discharges directly into unconsolidated material (alluvium) and associated ground water prior to ultimately discharging into the East Boulder River. Ground water standards established in ARM 17.30.1006 apply to all ground water outside of a DEQ approved mixing zone. These standards establish the maximum allowable change in ground water quality and provide a basis for limiting discharges to ground water. ARM 17.30.1005. Ground water is also subject to the nondegradation requirements in ARM 17.30.701-717. The water use classification is based on the natural specific conductance (SC) of the water.

The 2000 discharge permit granted a source specific mixing zone from the percolation ponds located at 45° 30' 16" N, 110° 04' 51" W, extending in a northwesterly direction approximately 3,600 feet downgradient and approximately 700 feet wide at its terminal end. The mixing zone was granted for total inorganic nitrogen (nitrite plus nitrate and ammonia) only. The permit required that total inorganic nitrogen shall not exceed the ground water nondegradation concentration of 7.5 mg/L at the end of the mixing zone as measured at the following locations: MW-2, MW-3, MW-6, MW-7, MW-8 and MW-9. In addition to quarterly monitoring at these wells, the permit also included monitoring at an upgradient monitoring well, identified as WW-1 which is located in the alluvial aquifer upgradient of the percolation ponds (Outfall 002).

Table 11. Ground water monitoring well summary for Total Inorganic Nitrogen (mg/L) 2001 through first quarter 2013

Well Number	Compliance Limit	25 th Percentile	75 th Percentile	Sample Size	2001 Average	2012 Average
WW-1	--	0.12	0.14	50	0.09	0.13
MW-2	7.5	0.15	12	50	0.11	31
MW-3	7.5	1.4	2.1	50	0.48	1.7
MW-6	7.5	1.8	21	37	0.40	22
MW-7	7.5	2.9	11.3	41	0.43	17.8
MW-8	7.5	0.81	1.14	16	NA ¹	0.89
MW-9	7.5	0.12	0.14	49	0.12	0.12

¹GW-MW-8 was constructed after 2001.

2.2.5 Pollutants of Concern

WQBEL are assessed for those pollutants of concern (POC) based on the effluent characteristics, federal effluent limit guideline (ELG), and the water quality objectives for the affected receiving water(s). DEQ has identified the POCs listed below for purposes of assessing WQBELs. Included in this list is any pollutant that has an assigned wasteload allocation as part of a TMDL, or for which the receiving waterbody is listed as impaired, exceeds a water quality standard or nondegradation criterion in the effluent, or is subject to a federal ELG.

In **Table 12**, DEQ identified the pollutants and parameters of concern for discharges from the Facility for purposes of assessing the need for and developing WQBELs. The East Boulder River is identified as the receiving water for all outfalls.

Table 12. Pollutants of Concern

Parameter	Basis for Identifying as a Pollutant of Concern
Outfall 001, 002	
Copper Zinc Lead Mercury Cadmium	Applicable TBELs
Copper Iron Lead	Approved Waste Load Allocation (TMDL)
Total Nitrogen Total Phosphorus	303(d) list (Chlorophyll-a, nutrients)
Ammonia Temperature Chromium Nickel Total Suspended Solids	Existing WQBELs – Outfall 001
Nitrate+Nitrite	Known/present and downstream segments listed as impaired on 303(d) list
Outfall 003	
Ammonia Nitrate + Nitrite Total Nitrogen Total Phosphorus	Typical sewage treatment parameters

2.2.6 Nondegradation Analysis

The MWQA includes a nondegradation policy at 75-5-303, MCA, which protects existing water quality from undue degradation. This policy applies to any new or increased activity which results in a change in existing water quality as defined in 17.30.702(17). The MWQA states that it is unlawful to cause degradation of state waters unless authorized by DEQ pursuant to ARM 17.30.706-708. The regulations at ARM 17.30.701-718 implement the state's nondegradation policy. The level of protection provided to the receiving water(s) is specified in ARM 17.30.705(2) and conforms to three

“tiers” of the federal antidegradation policy at 40 CFR 131.12. These three levels of protection are as follows:

Protection of Existing Uses (Tier 1): Existing and anticipated (designated) uses of state waters and the level of water quality necessary to protect those uses must be maintained and protected [ARM 17.30.705(2)(a)]. Tier I protection applies to all state waters including waters not designated as high quality. The effluent limitations applied to outfalls subject to this level of protection are derived from and comply with the state’s numeric and narrative water quality standards, and, therefore, ensure the level of water quality necessary to attain and maintain existing and anticipated uses are fully protected. Effluent limitations based on this level of protection need to also need to consider protection of any downstream or downgradient receiving waters, which may require a higher level of protection. ARM 17.30.706(3)(d).

Protection of High Quality Waters (Tier 2): Unless authorized by DEQ under ARM 17.30.706 – 708 (authorization to degrade) or exempted from review under 75-5-317 MCA, the quality of high-quality waters must be maintained (ARM 17.30.705(2)(b) and 75-5-303(2), MCA). High quality waters, as defined in 75-5-103(13) MCA and ARM 17.30.702(8), includes all state surface waters except those not capable of supporting any one of the designated uses for their classification or that have zero flow or surface expression for more than 270 days during most years. Any waterbody for which the receiving water pollutant concentration (C_s) is less than the applicable water quality standard (S) is considered high quality. This determination is made on a parameter by parameter basis and may include waters listed on the state’s 303(d) list.

Protection of Outstanding Resource Waters (Tier 3): ARM 17.30.705(2)(c) requires that, for outstanding resource waters, no degradation is allowed and no permanent change in the quality of outstanding resources waters resulting from a new or increased point source discharge is allowed.

Though the nondegradation criteria are not numeric water quality standards, a discharge that meets these criteria is in compliance with Montana’s nondegradation policy. New discharges (or sources) that are able to meet WQBELs based on application of nonsignificance criteria in 17.30.715 (1) are not required to submit an authorization to degrade state waters under ARM 17.30.706-708. WQBELs calculated from nondegradation criteria are discussed in **Section 2.2** and Appendix 5.

DETERMINATION – NEW OR INCREASED SOURCES

Effluent limits in the 2000 permit were based on nondegradation as follows:

- *Outfall 001:* Total recoverable metal limits for based on 15% of the lowest of the aquatic life standards or human health standards as contained in Circular DEQ-7, after mixing with the East Boulder River. In addition, phosphorus limits were based on the nondegradation trigger value change allowed per ARM 17.30.715(1)(c). With this renewal, DEQ has maintained the most stringent of limits based on the 2000- nonsignificance review and the current WQBEL review.
- *Outfall 002:* Review for limits based on human health standards for metals measured as dissolved at the end of the ground water mixing zone; using the mass-balance equation no metal limits were found to be necessary to protect ground water. With this renewal, DEQ has made changes to the nonsignificance evaluation for Outfall 002, using total recoverable metals to develop necessary limits to ensure nonsignificance in the East Boulder River based on both aquatic life standards and human health standards.

- *Outfalls 001 & 002 SUM:* Total nitrogen nondegradation load limit based on FEIS values and ARM 17.30.715(1)(c). The 2000 Permit included a footnote that the sum for TN was calculated by Total Nitrogen from Outfall 001 and Total Inorganic Nitrogen (TIN) from Outfall 002. However, DEQ does not have a surface water standard for TIN.

The renewal of a permit after its original issuance does not alter the need to evaluate for nondegradation limits. All three outfalls were determined to be new sources, and afforded Tier 2 nondegradation protection. For this renewal, DEQ re-evaluated the nonsignificance review and determined that since the permitted discharge through Outfall 002 was through ground water to surface water, the effluent limits must be based on the most stringent of the nonsignificance for ground water at the end of the mixing zone and surface water.

In addition, the following discussion was included in the 2000 Fact Sheet relative to Outfall 003:

“The FEIS completed in 1992 concluded that an increase in the instream nitrogen concentration to 1.0 mg/L at the 7Q10 would not cause undesirable or harmful algae growth. The increase is equivalent to adding 32 pounds of nitrogen per day at an instream flow equal to the 7Q10 of 5 cfs (2,245 gpm). The addition of 32 pounds is equivalent to an effluent discharge concentration of 3.6 mg/L at the maximum discharge flow of 737 gpm at the 7Q10. The 7Q10 occurs most often in the winter months in the East Boulder River. Average flows during the most prolific algal growth month of August are approximately 15 cfs, which equates to an instream nitrogen concentration of 0.36 mg/L.

DEQ Nondegradation Policy for septic systems suggests that the concentration of nitrate in effluent entering a drain field be set at 50 mg/L. The pounds of nitrate generated per day can be calculated by the formula:

Lbs of N = N concentration of effluent (mg/L) x gallons per minute (gpm) x 0.012, Where:

N concentration of effluent = 50 mg/L

Effluent flow (gpm) = 400 employees x 14.5 gpd / 1440 minutes/day = 4.0 gpm

Lbs of N = 50 mg/L x 4.0 gpm x 0.012 = 2.4 pounds”

The calculated nitrate+nitrite limit of 2 lbs per day from Outfall 003 will remain in this permit.

2.2.7 Mixing Zones

A mixing zone is an area where the effluent mixes with the receiving water and certain numeric water quality standards may be exceeded. ARM 17.30.502. The Board has adopted rules governing the granting of mixing zones in surface and ground water at ARM 17.30.501-518. These rules require that DEQ determine the applicability of any mixing zone in the permitting process. ARM 17.30.515. Mixing zones allowed under a permit issued prior to April 29, 1993, will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses. ARM 17.30.505. Discharges that do not conform to the criteria of ARM 17.30.501-518 are subject to review and modification.

In issuing a permit or authorization, DEQ must determine whether a mixing zone may or may not be granted for a particular parameter, and, if a mixing zone is granted, the type of mixing zone. Unless specifically requested, granted, and identified in the permit and permit fact sheet, a mixing zone is not

assumed for any parameter. The effluent must comply with all applicable effluent limitations and standards, and other treatment requirements in ARM 17.30.1203, 1206 and 1207 prior to the issuance of a mixing zone.

The discharge must also comply with the general prohibitions of ARM 17.30.637(1), which require that state waters, including mixing zones, be free from certain substances.

CHRONIC AND HUMAN HEALTH MIXING ZONE

Mixing zones may be granted for numeric chronic aquatic life, human health standards, and certain narrative standards. For new or increased sources, changes in water quality must be nonsignificant at the boundary of the mixing zone, unless degradation is authorized by DEQ pursuant to 75-5-303, MCA.

Depending on the effluent flow and the receiving water flow, DEQ may provide one of the following types of mixing zones in rivers or streams for chronic aquatic life and human health standards: 1) a nearly-instantaneous mixing zone; 2) a standard mixing zone; 3) an alternative mixing zone; or 4) a source-specific mixing zone. In order for DEQ to grant a mixing zone for a particular pollutant, the permittee must demonstrate that it cannot meet the applicable water quality standards at the point of discharge, and demonstrate that it meets the appropriate criteria specified in ARM 17.30.501-518. For purposes of water quality-based permitting calculations, it is necessary to calculate chronic dilution ratios. The chronic dilution ratio is a percent of the critical stream flow (7Q10 or 14Q5).

The chronic dilution allowance (Q_c) is calculated based on the percent (P_c) of the critical stream flow (Q_s) (**Equation 1**).

$$Q_c = \frac{Q_s \times P_c}{100} \quad \text{Equ.1}$$

The chronic dilution ratio (D_c) is expressed in terms of the critical effluent flow (Q_d) (**Equation 2**):

$$D_c = \frac{Q_c}{Q_d} \quad \text{Equ.2}$$

The calculated dilution ratios are summarized in **Table 13**.

ACUTE MIXING ZONES

In accordance with ARM 17.30.507(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless DEQ finds that allowing minimal initial dilution will not threaten or impair existing uses. In general, when considering the impact of a discharge on the receiving water, an acute mixing zone (zone of initial dilution) is not granted for toxic and persistent substances. ARM 17.30.506. To grant a mixing zone for acute standards, the discharger must demonstrate that allowing minimal, initial dilution will not threaten or impair existing beneficial uses. ARM 17.30.507. The critical factor in making this demonstration is to show that the acute mixing zone will not create a barrier to the migration of fish or cause acute lethality to passing or drifting

organisms. The Permittee must also demonstrate nearly instantaneous mixing. Instantaneous mixing is demonstrated through the use of an effluent diffuser, or, in some cases, where the volume of effluent is greater than the volume of the receiving water (effluent dominated). The acute dilution ratio (D_a) is expressed as an acute dilution allowance or percent (P_a) of the chronic dilution allowance (Q_c) (**Equation 3**).

$$D_a = \frac{Q_c \times P_a}{Q_d \times 100} \quad \text{Equ.3}$$

NUTRIENT MIXING ZONE

For nutrients, WQBELs will be based on the seasonal 14-day, five year (seasonal 14Q5) flow of the receiving water (DEQ-12A, ARM 17.30.516). Nutrients include total nitrogen and total phosphorus.

Mixing Zone Determination

Outfall 001

The chronic mixing zone authorized in the 2000 permit for discharges at Outfall 001 is retained in the permit. Granting of this mixing zone is based on the assumption that a properly designed and constructed diffuser will be installed and nearly instantaneous mixing will occur in the receiving water. No direct discharge to surface water is allowed until a diffuser is reviewed and approved by DEQ.

The 7Q10 flow of the East Boulder River is estimated to be 5 cfs (3.23 mgd) and the seasonal 14Q5 is estimated to be 10.5 cfs (6.79 mgd). The estimated 7Q10 is the same value used in the previous permit and the FEIS for the East Boulder project.

A chronic mixing zone will be used where monitoring data submitted by the Permittee has demonstrated assimilative capacity in the receiving water. The chronic mixing zone will be based on 100% of the 7Q10 due to the instantaneous mixing provided by a diffuser for temperature, ammonia, nitrate + nitrite, and the metals other than mercury. In addition, a chronic mixing zone will be granted based on 100% of the 14Q5 for TN and TP. In all cases, the chronic mixing zone will extend 100 feet downstream and 10 feet in width.

Acute mixing will be granted for ammonia, and metals with acute WQS, at 10% of the 7Q10. The acute mixing zone will extend for 10 feet downstream and 1 foot in width.

No mixing zone is granted for mercury because the receiving water background concentration for these parameters has not been sufficiently quantified to demonstrate concentrations are below the applicable water quality standard (i.e. the parameters were nondetect at a level greater than the standard).

Outfall 002

The ground water mixing zone granted in the 2000 permit for nitrate+nitrite at Outfall 002 is maintained in this permit renewal. No mixing zone was evaluated in the 2000 permit for metals or other contaminants.

The ground water mixing zone extends from the point of discharge beneath the tailings impoundment for approximately 3,600 feet. The mixing zone was modeled using a generalized analytical model (Visual Modflow) which delineated the vertical and horizontal extent of the mixing zone as approximately 700 feet at the lower end of the impoundment. The discharge mixes with an estimated 400 gpm (0.58 mgd) of ground water.

Due to the hydrologic connection between ground and surface water, WQBEL for Outfall 002 are based on nondegradation for both ground water and surface water. However, no surface water mixing zone is granted for discharges from Outfall 002 since the conveyance of pollutants beyond the end of the groundwater mixing zone extends a long distance before reaching the surface water [ARM 17.30.506(2)(h)]. The previous permit only looked at nondegradation of ground water based on the human health standards of dissolved metals, but because the discharge is through ground water to surface water, nondegradation must be evaluated for surface water and based on total recoverable metals.

Ground water dilution will be used to calculate WQBEL for nitrate+nitrite, iron, chromium, nickel, and zinc. No mixing zone is granted for cadmium, copper, lead and mercury because the ambient ground water background concentration for these parameters has not been sufficiently quantified to demonstrate concentrations are below the applicable water quality standard.

The dilution ratios have been adjusted based on the Permittee's projected daily effluent flow of 0.72 mgd for Outfalls 001 and 002 (**Table 13**).

Table 13. Calculated mixing zone dilution ratios

Outfall ¹	Q _d Effluent Flow (mgd)	Q _s Design Flow Receiving Water (mgd)	Q _c Chronic Dilution Allowance (%)	Q _a Acute Dilution Allowance (%)	D _c Chronic Dilution Ratio	D _a Acute Dilution Ratio
001	0.72	3.23	100	10	4.5	0.45
002	0.72	0.58	100	10	0.8	0.08
Nutrients	0.72	6.79	100	--	9.4	--

¹No mixing zone dilution ratio is necessary for Outfall 003 as the WQBEL is maintained from the 2000 Permit.

WATER QUALITY ASSESSMENT

Along with the general provisions for designation of a mixing zone in ARM 17.30.505 and the specific requirements in ARM 17.30.507, a mixing zone will not be authorized if it would threaten or impair existing beneficial uses. In making this determination, DEQ must complete a Water Quality Assessment based on information provided by the Permittee. **Table 14** presents a summary of this.

Table 14. Water Quality Assessment — ARM 17.30.506(2)

<p>Biologically Important Area—(a) <i>Biologically important areas: the presence of fish spawning areas or shallow water nursery areas within the proposed mixing zone or a "shore hugging" effluent plume in an aquatic life segment will support a finding that the mixing zone may be inappropriate during the spawning or nursery periods.</i></p> <p>001: Effluent diffuser will ensure complete and rapid mixing which will preclude shore hugging plume; Yellowstone cutthroat trout are present in the upper East Boulder River and are listed as a species of special concern. Spawning gravels and rearing areas unknown.</p> <p>002 & 003: Discharges to ground water —No surface water mixing zone.</p>
<p>Drinking Water Intake—(b) <i>Drinking water or the existence of a drinking water intake, a zone of influence around a drinking water well or a well used for recreational purpose.</i></p> <p>001/002: Surface water - Nearest public drinking water intake is the City of Laurel in Yellowstone River approximately 70 miles downstream; private intakes status unknown. Effluent limits ensure protection and potability of receiving water.</p> <p>002 & 003: Ground Water – No drinking water wells in designate mixing zone; effluent comingles with other wastes from mine.</p>
<p>Recreational Area— (b) <i>Recreational activities or a recreational area within or immediately adjacent to the proposed mixing zone will support a finding that a mixing zone is not appropriate. For purposes of these rules, "recreational" refers to swimming and "recreational area" refers to a public beach or swimming area, including areas adjacent to streams or lakes.</i></p> <p>001: Rapid and complete mixing ensures no impairment of use; recreation use applies to entire surface water.</p> <p>002 & 003: Discharges to ground water – No surface water mixing zone is granted for this Outfall.</p>
<p>Attraction to aquatic life— (c) <i>Attraction of aquatic life to the effluent plume: where currently available data support a conclusion that fish or other aquatic life would be attracted to the effluent plume, resulting in adverse effects such as acute or chronic toxicity, it may be appropriate to adjust a given mixing zone for substances believed to cause the toxic effects.</i></p> <p>001: Elevated temperature may result in attraction of aquatic life during winter discharges; cold shock potential if discharge is terminated during winter months.</p> <p>002 & 003: Discharges to ground water – No surface water mixing zone is granted for this Outfall.</p>
<p>Toxic or Persistence Substances— (d) <i>Toxicity/persistence of the substance discharged: where a discharge of a parameter is at a concentration that is both toxic and persistent, it may be appropriate to deny a mixing zone. Toxicity and persistence will be given added weight to deny a mixing zone where the parameter is expected to remain biologically available and where a watershed-based solution has not been implemented. For ground water, this factor will also be considered in areas where the parameter may remain in the ground water for a period of years after the discharge ceases.</i></p> <p>001: Effluent diffuser will ensure complete and rapid mixing.</p> <p>002: Ground Water – No drinking water wells in designated mixing zone.</p> <p>003: No toxic or persistent pollutants are expected.</p>

Table 14. Water Quality Assessment — ARM 17.30.506(2)

<p>Passage of aquatic organisms— (e) <i>Passage of aquatic organisms (including access to tributaries): where currently available data indicate that a mixing zone would inhibit migration of fish or other aquatic species, no mixing zone may be allowed for the parameters that inhibit migration. In making this determination, DEQ will consider whether any parameter in the effluent plume will block migration into tributary segments.</i></p> <p>001: Diffuser ensures rapid and complete mixing; minimal blockage expected.</p> <p>002 & 003: Discharges to ground water – No surface water mixing zone is granted for this Outfall.</p>
<p>Cumulative effects— (f) <i>Cumulative effects of multiple mixing zones: in some cases, the existence of multiple or overlapping mixing zones may threaten or impair the existing uses of the receiving water, so that any additional mixing zone will be limited or denied for the parameter of concern.</i></p> <p>001: Effluent diffuser will ensure complete and rapid mixing. Potential for overlapping mixing zone in surface water mixing zone is granted for Outfalls 002 & 003, but no surface water mixing zone was granted.</p> <p>002 & 003: Cumulative effect may be present if discharge from Outfall 001 occurs, but the discharge is to ground water and no surface water mixing zone is granted.</p>

2.2.8 Reasonable Potential Analysis (RPA)

No wastes may be discharged, either alone or in combination with other wastes, or activities that will violate or can reasonably be expected to violate any of the standards. All effluents must be assessed by the permitting authority to determine the need for WQBELs in the permit. Limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard. A “reasonable potential analysis” (RPA) is used to determine whether a discharge, alone or in combination with other sources of pollutants already present in the waterbody, could lead to an excursion above a numeric or narrative water quality standard.

For purposes of developing WQBEL and performing a RPA, a mass-balance equation is used (**Equation 4**). The mass-balance equation, given below, is a steady-state equation which is used to determine the concentration of a pollutant after accounting for other sources of pollution in the receiving water and any dilution provided by a mixing zone.

$$Q_r C_r = Q_s C_s + Q_d C_d \quad (\text{Equ. 4})$$

Where:

Q_s	=	critical stream flow at point of discharge, Section 2.2.3
C_s	=	critical background pollutant concentration, Section 2.2.3, Appendix 2
Q_d	=	critical effluent flow, Appendix 3
C_d	=	critical effluent pollutant concentration, Appendix 3
Q_r	=	resultant in-stream flow after discharge ($Q_r = Q_s + Q_d$)
C_r	=	resultant in-stream pollutant concentration

Where the projected receiving water concentration (C_r) exceeds a standard or nondegradation criterion for the pollutant, there is reasonable potential and a WQBEL must be included in the permit.

In addition to numeric water quality standards, effluent limitations must be included in permits if there is a reasonable potential to exceed narrative standards. This includes the general prohibitions ('free from') provision in ARM 17.30.637 including toxicity.

Appendix 4 describes the methodology and procedure included in the RPA.

RPA RESULTS

Outfall 001

For the pollutants identified in **Section 2.2.5**, reasonable potential to exceed water quality standards in the East Boulder River was established for ammonia, TN, TP, and zinc. The RPA results are summarized in Table 4.A. Effluent metal data used in this analysis was based on the dissolved fraction of the effluent. Pollutant concentrations based on total recoverable analysis may be an order of magnitude greater than those based on dissolved; however, DEQ believes this is representative of the future effluent quality, since the Facility has committed to installing additional wastewater treatment that will filter most suspended material.

Other than zinc, an RPA was not conducted on any pollutants regulated by TBEL, since WQBEL will be developed for them. In addition, the RPA did not address temperature. No new information was submitted by the Permittee for temperature, and, therefore, effluent limits from the previous permit will be maintained.

The RPA included nutrients (total nitrogen and total phosphorus) for comparative purposes, however the Permittee has requested a variance from these standards. The nutrient variance is discussed in the next section.

Outfall 002

Table 4.B summarizes the RPA for Outfall 002. The RPA for this Outfall was based on dilution with ground water before the pollutants in the effluent reached surface water. The RPA did not include or address the impacts to ground water from other sources at the mine that are not regulated by the MPDES permit. The RPA also did not include an assumption of surface water mixing, since the ground water is estimated to flow for 6,000 feet before it is discharged into the East Boulder River.

WQBEL will be developed for all pollutants regulated by TBEL. RPA was not performed for temperature, nutrients, and ammonia. The 2000 permit included a load limit for total nitrogen which is discussed in **Section 2.2.9**.

Outfall 003

RPA was not performed for nutrients. This permit renewal maintains the 2000 permit load limit for nitrate + nitrite, and is discussed in **Section 2.2.9**.

REASONABLE POTENTIAL ANALYSIS (RPA)—WHOLE EFFLUENT TOXICITY

The existing permit requires acute WET testing for discharges at Outfall 001. Because there have not been any discharges at Outfall 001, the Permittee has not yet conducted acute WET testing and, therefore, no reasonable potential analysis for WET has been conducted.

2.2.9 Water Quality-Based Effluent Limits

Water quality-based effluent limits must be calculated for both individual pollutants and for WET when there is a reasonable potential to exceed a numeric standard, narrative standard, or nondegradation criterion. The procedure and basis for these calculations are discussed in Appendix 5 and WET is discussed in **Section 2.2.10**. For existing dischargers, WQBEL are based on numeric or narrative water quality standards. For new discharges, WQBEL are based on the State's nonsignificance criteria unless the Permittee has requested an authorization to exceed the nondegradation criteria in accordance with ARM 17.30.706-708. Water quality standards and the applicable nonsignificance criteria are given in Appendix 1.

The procedure and calculated WLAs are described in Appendix 5 for individual pollutants. Final WQBELs are discussed below and summarized in **Table 15** through **Table 17**.

Outfall 001

WQBEL for Outfall 001 are given in **Table 15** and compared to the limits in the 2000 permit – the most stringent will be applied for this renewal. Effluent limits that are applicable as a sum of both Outfalls are summarized in **Table 17**.

The previous permit expressed effluent limits in terms of 30-day average and instantaneous maximum concentration. To maintain consistency with state and federal regulation governing effluent limitations, all limits will be expressed as average monthly limits (AML) and maximum daily limits (MDL), except as noted. The following changes were made as part of this permit renewal:

- A new WQBEL was developed for mercury discharged at Outfall 001. Mercury is subject to TBEL but a limit was not included in the previous permit. For this permit renewal, DEQ determined that the Facility has RP and developed WQBEL.
- New, less stringent, limits were developed for ammonia based on nonsignificance using updated ambient data. The revision was necessary based on new information collected since the 2000 permit was issued, specifically; monitoring data provided revised data on pH and temperature.
- A WQBEL for manganese is not included in the permit for Outfall 001. The previous permit included manganese limits, but manganese water quality standards no longer exist.
- The 2000 permit included an instantaneous maximum effluent limitation on flow. This limit was based on nondegradation criteria. Flow is required to be monitored, but is no longer limited in the permit. Daily monitoring and reporting of flow will be required in the permit.

- The temperature limit from the 2000 permit will be maintained, but has been amended to be more closely aligned with the standard which allows no more than 1 degree Fahrenheit increase.
- Total nitrogen (TN) is a parameter of concern that is subject to the new DEQ Circulars DEQ-12A and DEQ-12B. The Facility cannot meet the TN standard; therefore, DEQ calculated a variance limit under Circular DEQ-12B. Furthermore, after a stringency review DEQ found that a variance limit is less stringent than the previous SUM limit for TN, and the previous limit is maintained.
- Total phosphorus limits were included in the 2000 permit as concentration-based effluent limitations based on nonsignificance criteria (trigger value). The previous permit also included seasonal restrictions for 'calculated instream phosphorus increase' in addition to the numeric effluent limits. These limits have been removed and are replaced by average monthly load effluent limits dictated by the nutrient variance under Circular DEQ-12B, since the Facility could not meet the effluent limits calculated to meet the Circular DEQ-12A standard.

Outfall 002

The 2000 permit did not develop Outfall 002 effluent limits for pollutants other than nitrogen. In conducting this permit renewal, DEQ determined that additional effluent limits are required for Outfall 002 based on the following rationale:

- TBEL, at minimum, are necessary to control pollutants in the discharge from Outfall 002 (see Section 2.1). WQBEL were developed for pollutants regulated as a TBEL and compared to the TBEL in order to determine the most stringent limit;
- Circular DEQ-7 – the water quality standards that protect surface water are expressed as total recoverable metals. Although the discharge from Outfall 002 is to the ground water, it is considered a conveyance to surface water and the resulting permit limits must be protective of both ground water and surface water. Therefore, DEQ determined that the metal limits must reflect DEQ-7 by being expressed as total recoverable.
- Nondegradation must be met for both ground water and surface water. One example is that the ground water nondegradation limit for nitrate + nitrite is 7.5 mg/L. In addition, the nondegradation limit for nitrate + nitrite in surface water is 15% of the human health standard of 10 mg/L, based on ARM 17.30.715(1)(c).

The 2000 permit included an effluent limit on total nitrogen calculated as the sum of Outfalls 001(TN) and 002 (TIN). The 2000 permit also set compliance limits for nitrogen (TIN) in monitoring wells known as MW-2, MW-3, MW-6, MW-7, MW-8, and MW-9. These compliance limits were set to protect both ground water at nondegradation levels. As discussed in **Section 2.2.4**, these limits were exceeded by significant amounts and remedial activities are ongoing under an Administrative Order on Consent (Docket No. WQA-10-04). In order to protect both surface and ground water from additional degradation, the total nitrogen limit formerly applied to the sum of both outfalls will be applied to Outfall 002 only. Total nitrogen (and total phosphorus) in Outfall 001 are now based on the nutrient variance. These effluent limits apply to all wastewater discharged from the mine into the percolation ponds designated as Outfall 002.

During the previous permit cycle, the facility sampled for sulfate at Outfall 002, which is subject to the narrative water quality standard requiring state waters be free from concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life. Research on the levels where sulfate has an impact on use or impact of the biology/ecology of the East Boulder River are well above effluent concentrations (Sulfate Translation Guidance: WQPBWQSTD-009). No limits or monitoring are included in the draft permit for sulfate.

Outfall 001 and 002 (SUM)

The previous limit was expressed as annual average of 10,950 pound Total Nitrogen per year, or 30 pounds of nitrogen per day to East Boulder River from both Outfalls. This limit has been maintained but expressed as 30 lb/day TN average monthly limit. This is a change in that the previous permit allowed compliance with this to be demonstrated by the sum of total nitrogen from Outfall 001 and total inorganic nitrogen from Outfall 002; however, DEQ does not have a standard for inorganic nitrogen in surface water.

In addition to the individual effluent limits for Outfalls 001 and 002, the wasteload allocations from the August 31, 2009, Boulder River TMDL are applied to the combined Outfalls as AML expressed in pounds per day (**Table 17**).

Outfall 003

DEQ has maintained the calculated nitrate + nitrite limit of 2 lbs per day that had been calculated as part of the FEIS.

Table 15. WQBEL— Outfall 001 to East Boulder River

Parameter	Units	Previous Permit Effluent Limits		Calculated Effluent Limits for this Permit ^{1,2}	
		Average Monthly	Instantaneous Maximum	Average Monthly	Maximum Daily
Temperature, Allowable Instream Increase	°F	1	1.5	--	--
Cadmium, Total Recoverable	µg/L	1.4	2.1	0.7	1.1
Chromium, Total Recoverable	µg/L	50	75	--	--
Copper, Total Recoverable	µg/L	8	12	10	15
Iron, Total Recoverable	µg/L	430	650	--	--
Lead, Total Recoverable	µg/L	1.0	1.5	5.8	8.5
Mercury, Total Recoverable	µg/L	--	--	0.005	0.007
Zinc, Total Recoverable	µg/L	30	45	95	139
Nickel, Total Recoverable	µg/L	24	36	151	220
Ammonia Nitrogen, Total, as N	mg/L	0.77	1.16	1.5	2.2
Total Phosphorus	mg/L	0.10	0.15	0.22 ³	--
Footnote: ¹ Calculated Effluent Limits for this permit were based on WQS, except mercury which had not had nondegradation analysis conducted as part of the previous permit and ammonia which has nonsignificance for updated standards. ² Bold limits are the WQBEL proposed for final limits. ³ TP calculated for this permit is seasonal.					

Table 16. WQBEL— Outfall 002 to Ground Water

Parameter	Units	Previous Permit Effluent Limitations		Calculated Effluent Limitations	
		Average Monthly	Instantaneous Maximum	Average Monthly	Maximum Daily
Cadmium, Total Recoverable	µg/L	--	--	0.024	0.035
Copper, Total Recoverable	µg/L	--	--	0.78	1.14
Iron, Total Recoverable	µg/L	--	--	696	1,016
Lead, Total Recoverable	µg/L	--	--	0.20	0.28
Mercury, Total Recoverable	µg/L	--	--	0.005	0.005
Zinc, Total Recoverable	µg/L	--	--	12	17
Nickel, Total Recoverable	µg/L	--	--	6.2	9.1
Nitrate + Nitrite	mg/L	--	--	2.6	3.8

Table 17. WQBEL— SUM Outfalls 001 and 002

Parameter	Units	Effluent Limitations Previous Permit ¹		Calculated Effluent Limitations ²	
		Average Monthly	Maximum Daily	Average Monthly	Maximum Daily
Total Nitrogen, as N	lbs/day	30	45	30	45
Copper, Total Recoverable	lbs/day	--	--	0.061	--
Iron, Total Recoverable	lbs/day	--	--	28.5	--
Lead, Total Recoverable	lbs/day	--	--	0.005	--

¹The 2000 Permit included a total nitrogen limit of 10,950 lbs per year annual average, which is equivalent to 30 lbs/day monthly average. In addition, the 2000 Permit included a total nitrogen limit of 45 lbs/day maximum daily, except for allowing 77 lbs/day in June when the East Boulder River flows exceed 22 cfs. DEQ has removed this special caveat.

2.2.10 Whole Effluent Toxicity Limitations

The 2000 permit prohibited acute toxicity in the discharge from Outfall 001. The Permittee reports that there has been no discharge from this Outfall and therefore WET testing was not performed.

Because the dilution ratio for Outfall 001 is 4.5 (**Section 2.2.7**) chronic testing is more appropriate. Chronic testing is required when the dilution ratio is less than 10 in ARM Subchapter 13. The permit will maintain the prohibition of toxicity in the effluent and require two species chronic WET testing. No mixing zone for acute or chronic toxicity is authorized by the permit.

WET testing is not required at Outfall 002.

2.3 Final Effluent Limitations and Conditions

The final effluent limitations in the permit are based on the more stringent of the calculated TBELs and WQBELs for each parameter, subject to an anti-backsliding analysis. The more stringent limitations will attain both the technology and water quality standards. Stringency of TBEL and WQBEL must be based on a common averaging period, and, for metals, total recoverable method of analysis.

2.3.1 Stringency Analysis

For both Outfalls, final limits for metals are based on nondegradation-based criteria required by Montana nondegradation policy. These limits are more stringent than TBEL. This includes effluent limits for cadmium, copper, lead, mercury, and zinc. The technology-based effluent limitations for conventional pollutants including total suspended solids and pH are based on BPJ. Maintaining compliance with the limitations will also be protective of water quality standards for these pollutants.

2.3.2 Anti-backsliding Analysis

Section 402(o) of the Clean Water Act and section 122.44(l) require, with some exceptions, that effluent limitations or conditions in reissued permits be at least as stringent as those in the existing permit. Effluent limits from the 2000 permit are summarized in **Tables 15 - 17**.

Outfall 001

The effluent limitations for this Outfall are at least as stringent as the effluent limitations in the previous permit, with the exception of ammonia which is based upon nonsignificance for ammonia standards developed using an updated ambient data set (**Table 18**).

The 2000 permit requires that a discharge to surface water was only authorized when a discharge to ground water or to land application was infeasible. This language has been removed from the permit. Except for nutrients, effluent limitations for Outfall 001 are based on the most stringent of current WQBELs and nonsignificance criteria, and therefore are not considered anti-backsliding.

Narrative prohibitions covering the discharge of floating solids or visible foam and any discharge that causes visible oil sheen in the receiving stream are maintained.

Outfall 002

The 2000 permit did not impose effluent limits for Outfall 002 except the total nitrogen limit which was applied to the sum of Outfalls 001 and 002. This renewal adds the most stringent of TBELs and WQBELs based on nonsignificance. Final effluent limitations for Outfall 002 are provided in **Table 19**.

The previous permit contained compliance monitoring for wells MW-2, MW-3, MW-6, MW-7, MW-8 and MW-9. The permit required corrective action if the concentration of total nitrogen exceeded 6.5 mg/L. This limit was set to protect both surface and ground water from degradation in accordance with ARM 17.30.715. Beginning in 2007 and continuing through 2014, monitoring data demonstrated exceedance of these compliance limits in a number of wells. In 2010, the Permittee and DEQ executed an Administrative Order on Consent setting forth terms and conditions of an on-going ground water remediation plan and continued monitoring of these and other wells as part of the Order. Because the Order contains ground water monitoring for nitrogen, compliance limits will no longer be set in the permit.

Effluent limitations for the sum of Outfall 001 and Outfall 002 (SUM) is provided in **Table 20**.

Table 18. Final effluent limitations for Outfall 001 to East Boulder River

Parameter	Units	Effluent Limitations		Basis
		Average Monthly	Maximum Daily	
pH	SU	6.0 to 9.0		BPJ-Existing
Total Suspended Solids	mg/L	20	30	BPJ-Existing
Cadmium, Total Recoverable	µg/L	0.7	1.1	WQBEL-Revised
Chromium, Total Recoverable	µg/L	50	75	WQBEL - Existing
Copper, Total Recoverable	µg/L	8	12	WQBEL - Existing
Iron, Total Recoverable	µg/L	430	650	WQBEL-Existing
Lead, Total Recoverable	µg/L	1.0	1.5	WQBEL-Existing
Mercury, Total Recoverable	µg/L	0.005	0.007	WQBEL-New
Nickel, Total Recoverable	µg/L	24	36	WQBEL-Existing
Zinc, Total Recoverable	µg/L	30	45	WQBEL-Existing
Ammonia Nitrogen, Total, as N	mg/L	1.5	2.2	WQBEL-Revised
Total Phosphorus July 1 to September 30	lbs/day	12	--	Nutrient Variance
Temperature, Allowable Instream Increase	°F	--	1	WQBEL-Existing
Whole Effluent Toxicity Chronic, <i>Ceriodaphnia</i> 7-Day, Static Renewal (TCP3B)	Percent Effluent	>100	>100	WQBEL-Revised
Whole Effluent Toxicity Chronic, <i>Pimephales</i> 7-Day, Static Renewal(TCP6C)	Percent Effluent	>100	>100	WQBEL-Revised

Table 19. Final effluent limitations for Outfall 002 to Ground Water

Parameter	Units	Effluent Limitations		Basis
		Average Monthly	Maximum Daily	
pH	SU	6.0 to 9.0		BPJ – New
Total Suspended Solids	mg/L	20	30	BPJ – New
Cadmium, Total Recoverable	µg/L	0.024 ¹	0.035	WQBEL – New
Copper, Total Recoverable	µg/L	0.78 ¹	1.14 ¹	WQBEL – New
Iron, Total Recoverable	µg/L	696	1,016	WQBEL – New
Lead, Total Recoverable	µg/L	0.20 ¹	0.28 ¹	WQBEL – New
Mercury, Total Recoverable	µg/L	0.005	0.005	WQBEL – New
Nickel, Total Recoverable	µg/L	6.2	9.1	WQBEL – New
Zinc, Total Recoverable	µg/L	12	17	WQBEL – New
Nitrate + Nitrite	mg/L	2.6	3.8	WQBEL – New
¹ Required reporting value (RRV) in DEQ-7 is greater than the effluent limitation; in these cases, analytical results less than or equal to the RRV will be considered to be in compliance with the limit.				

Table 20. Final effluent limitations for sum of Outfall 001 and Outfall 002

Parameter	Units	Effluent Limitations		Basis
		Average Monthly	Maximum Daily	
Total Nitrogen, as N ¹	lbs/day	30	45	Modification of Existing WQBEL
Copper, Total Recoverable	lbs/day	0.061	--	TMDL Boulder River
Iron, Total Recoverable	lbs/day	28.5	--	TMDL Boulder River
Lead, Total Recoverable	lbs/day	0.005	--	TMDL Boulder River
¹ Total Nitrogen, as N is calculated as the sum of TKN and nitrate + nitrite. The <u>final</u> Total Nitrogen, as N limit for the SUM of Outfall 001 and Outfall 002 is calculated from the TN from Outfall 001 and from Outfall 002.				

Table 21. Final effluent limitations for Outfall 003

Parameter	Units	Effluent Limitations		Basis
		Average Monthly	Maximum Daily	
Nitrate + Nitrite	lbs/day	2.0	--	WQBEL – Calculated from Existing

2.3.3 Additional Effluent Limitations and Conditions

The Permittee is required to comply with the additional effluent limitations and conditions described below. These conditions are retained from the existing permit.

Additional Effluent Limitations and Conditions—Outfall 001

Effective immediately and lasting through the term of this permit, discharges from Outfall 001 are subject to the additional conditions listed below.

- a. There shall be no discharge of floating solids or visible foam in other than trace amounts.
- b. There shall be no discharge that causes visible oil sheen in the receiving stream.

2.3.4 Interim Effluent Limitations

The Facility is provided a 58-month compliance schedule before the effluent limits become final. From the effective date of the permit until that time, the following effluent limits apply:

Table 22. Interim effluent limitations for Outfall 001 to East Boulder River			
Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
pH	SU	6.0 to 9.0	
Total Suspended Solids	mg/L	20	30
Cadmium, Total Recoverable	µg/L	1.4	2.1
Chromium, Total Recoverable	µg/L	50	75
Copper, Total Recoverable	µg/L	8.0	12.0
Iron, Total Recoverable	µg/L	430	650
Lead, Total Recoverable	µg/L	1.0	1.5
Nickel, Total Recoverable	µg/L	24	36
Zinc, Total Recoverable	µg/L	30	45
Ammonia Nitrogen, Total, as N	mg/L	1.5	2.2
Total Phosphorus July 1 to September 30	lbs/day	12	--
Temperature, Allowable Instream Increase	°F	--	1
Whole Effluent Toxicity Chronic, <i>Ceriodaphnia</i> 7-Day, Static Renewal (TCP3B)	Percent Effluent	>100	>100
Whole Effluent Toxicity Chronic, <i>Pimephales</i> 7-Day, Static Renewal(TCP6C)	Percent Effluent	>100	>100

Table 23. Interim effluent limitations for sum of Outfall 001 and Outfall 002

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Total Nitrogen, as N ¹	lbs/day	30	45
Copper, Total Recoverable	lbs/day	0.061	--
Iron, Total Recoverable	lbs/day	28.5	--
Lead, Total Recoverable	lbs/day	0.005	--
¹ The <u>interim</u> total nitrogen limit is calculated by taking the sum of the total nitrogen discharged at Outfall 001 and the total inorganic nitrogen discharged at Outfall 002.			

Table 24. Interim effluent limitations for Outfall 003

Parameter	Units	Effluent Limitations	
		Average Monthly	Maximum Daily
Nitrate + Nitrite	lbs/day	2.0	--

3 MONITORING AND REPORTING REQUIREMENTS

All permits must specify: 1) requirements concerning the proper use, maintenance, and, when appropriate, installation of monitoring equipment or methods (including biological monitoring); 2) required monitoring including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including continuous monitoring; 3) applicable reporting requirements based upon the impact of the regulated activity, and; 4) as applicable, include monitoring and reporting of storm water discharges. ARM 17.30.1351. This section provides the basis for the monitoring and reporting requirements included in the permit.

In addition, permits must include monitoring requirements sufficient to determine compliance with permit limitations and other conditions of the permit including requirements to monitor: 1) the mass, or other measurement specified in the permit, for each pollutant limited in the permit; 2) the total volume of effluent discharged from each outfall; 3) other measurements, as specified in 40 CFR 122.44(i)(1)(iii); and, 4) pollutants according to test procedures approved under 40 CFR 136, unless another method is specified in 40 CFR Subchapters N or O.

Samples will reflect the nature of the discharge. Samples shall be collected, preserved and analyzed in accordance with approved procedures listed in 40 CFR 136. Analytical methods must achieve the required reporting value (RRV) specified in the latest version of DEQ Circular DEQ-7, unless otherwise specified in the permit.

Effluents must be measured and sampled prior to dilution with any receiving waters for compliance with the effluent limitations given in the discharge permit. Effluent limitations are based on daily discharge. Daily discharge is the discharge of pollutants measured during a calendar day or any 24-hr period (ARM 17.30.1304(18)). For pollutants with limitation expressed in terms of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with

limits expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

All permit effluent limitations, standards, or prohibitions for metals must be expressed as total recoverable metal as defined in 40 CFR 136 unless: 1) the applicable effluent standard or limitation has been expressed in another form; 2) in establishing permit limits on a case-by-case basis under ARM 17.30.1203; or 3) the approved method for the metal only measures the dissolved form (e.g. hexavalent chromium).

In addition to the specific monitoring requirements described in this section, the permit contains standard monitoring requirements contained in ARM 17.30.1342.

3.1 Monitoring Location

The authorization to discharge is limited to those locations specially identified in the Facility's MPDES permit application and designated in the permit. The Permittee must monitor the effluent to demonstrate compliance with the effluent limitations and other requirements of this permit at the locations specified in **Table 24**.

Table 24. Monitoring location designations and site descriptions

Outfall Designation	Monitoring Location Designation	Monitoring Description
001	001A	At the end of the pipe discharging into the East Boulder River, prior to mixing with the receiving water.
001	001U	East Boulder River – 100 feet upstream of effluent diffuser
001	001D	East Boulder River – 100 feet downstream of effluent diffuser
002	002A	At the end of the pipe or ditch discharging into the percolation pond identified on Figure 2 in the Facility's permit application.
003	003A	After treatment prior to discharge into ground water

In addition, the existing monitoring wells (WW-1, MW-2, MW-3, MW-6, MW-7, MW-8, and MW-9) will remain as monitoring locations in this permit, but due to ongoing remediation and the AOC, they will not be used for compliance determination and will be included in **Section 4** (Special Conditions).

3.2 Monitoring Determination

Monitoring requirements for the discharges and monitoring locations described in **Section 3.1** are discussed and given in below. These monitoring frequencies are incorporated into the discharge permit. Monitoring frequencies for most parameters are similar to the 2000 permit with minor adjustments discussed below.

Outfall 001

Except mercury, monitoring for toxic pollutants is required on a weekly basis or four samples per month. Mercury is sampled once per month due to the low level analysis necessary and additional sampling requirements associated with this pollutant. Monitoring for pH and TSS has been increased to three times per week for pH and TSS to ensure adequate wastewater treatment.

The 2000 permit required effluent volume to be measured on an instantaneous basis and reported in gallons per minute. Instantaneous measurements are not adequate to determine the daily discharge volume, and, therefore, this requirement will be changed to continuous monitoring. Effluent flow must be monitored on a continuous basis and reported as total volume per day.

The permit no longer requires monitoring for orthophosphate or total inorganic nitrogen at Outfall 001. Monitoring for nutrients is based on total nitrogen and total phosphorus to be consistent with the nutrient standards and variance requirements. There is no approved method for total nitrogen in 40 CFR 136. Total nitrogen is measured as the sum of the various components, including Total Kjeldahl Nitrogen, nitrite plus nitrate (as N), and ammonia. These components may be measured using any combination of approved methods and summed to report the total nitrogen concentration and load calculations.

The permit will also require continuous instream monitoring for temperature above (001U) and below (001D) the point of discharge to serve as a basis for calculating the reported value for this parameter. The Permittee must install, operate, and maintain a temperature monitoring device that records instream temperature at a minimum of 15-minute intervals and can report daily average temperature. The temperature difference is determined by subtracting the downstream average daily temperature from the upstream average daily temperature. The Permittee must develop a protocol to implement this monitoring requirement. Instream monitoring is only required when effluent is discharged to the East Boulder River through Outfall 001. However, monitoring must commence at least 48 hours prior to initiation of any discharge to surface water and continue for at least 96 hours after the discharge is terminated. Ambient monitoring is further discussed in **Section 4** (Special Conditions).

The 2000 permit contained a number of monitoring requirements for calculating net credits and adjustments to reported values based on theoretical treatment efficiencies of land application, unaltered ground water, or other processes. No effluent limitations in this permit allow net credits or other adjustments, and, therefore, these requirements have been removed. All mine drainage at the Facility discharged through Outfalls 001 and 002 must be monitored for compliance with the applicable effluent limitation.

Outfall 002

Monitoring for all toxic pollutants is required on a monthly basis. The reduced frequency of monitoring for Outfall 002 is justified since the effluent travels through ground water before entering surface water. Monitoring for pH and TSS has been added to address the TBEL for these parameters and ensure adequate wastewater treatment and compliance with effluent limits.

The 2000 permit required effluent flow rate to be measured on an instantaneous basis. Effluent flow must be monitored on a continuous basis and reported as total volume per day to be consistent with state and federal regulations for flow monitoring.

Reporting of total inorganic nitrogen (ammonia and nitrite plus nitrate) is no longer required to reflect the revised effluent limitations for nitrogen. Monitoring for total nitrogen is required and discussed above under Outfall 001.

Ground water compliance monitoring at the downgradient boundary of the mixing zone has been removed. Compliance monitoring is required under the Administrative Order; in addition, ground water monitoring will be required under Special Conditions.

Outfall 003

Monitoring is required on a quarterly basis.

3.3 Whole Effluent Toxicity (WET) Testing

Quarterly chronic WET testing requirements will be required at Outfall 001. No mixing zone for acute or chronic toxicity is authorized by the permit. The permit will include standard conditions requirements for chronic testing based on EPA methods 1002.0 (*Ceriodaphia dubia*) and 1000.0 (*Pimephales promelas*). WET monitoring is only required if the Permittee discharges at Outfall 001. The permit requires the permittee to conduct testing on both species based on a definitive test using a 0.5 dilution series.

Additional requirements such as toxicity reduction and identification studies are included in the permit. These requirements are not waived if the discharge to Outfall 001 is redirected to another permitted Outfall.

3.4 Reporting Requirements

All monitoring requirements established in this section shall be reported to DEQ on a monthly or quarterly basis (**Tables 23 - 27**). The Permittee must comply with reporting requirements as specified in ARM 17.30.1342 which are included in the permit.

Table 25. Monitoring requirements at monitoring location 001A

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV) ¹	Reporting Requirement
Effluent Flow Rate (00056)	mgd	Continuous	Recording Device	--	Daily Max & Mo Avg
pH (00400)	s.u.	3/Week	Instantaneous	0.1	Daily Min & Daily Max
Total Suspended Solids (00530)	mg/L	3/Week	Grab	1	Daily Max & Mo Avg
Cadmium, Total Recoverable (01113)	µg/L	1/Week	Grab	0.03	Daily Max & Mo Avg
Chromium, Total Recoverable (01034)	µg/L	1/Week	Grab	10	Daily Max & Mo Avg
Copper, Total Recoverable (01119)	µg/L	1/Week	Grab	2	Daily Max & Mo Avg
Iron, Total Recoverable (00980)	µg/L	1/Week	Grab	20	Daily Max & Mo Avg
Lead, Total Recoverable (01114)	µg/L	1/Week	Grab	0.3	Daily Max & Mo Avg
Mercury, Total Recoverable (71901)	µg/L	1/Month	Grab	0.005	Daily Max & Mo Avg
Nickel, Total Recoverable (01074)	µg/L	1/Week	Grab	2	Daily Max & Mo Avg
Zinc, Total Recoverable (01094)	µg/L	1/Week	Grab	8	Daily Max & Mo Avg
Ammonia, as N (00610)	mg/L	1/Week	Grab	0.05	Daily Max & Mo Avg
Nitrate + Nitrite (as N) (00630)	mg/L	1/Week	Grab	0.2	Daily Max & Mo Avg
Total Kjeldahl Nitrogen (TKN) (00625)	mg/L	1/Week	Grab	0.1	Mo Avg
Total Nitrogen, as N (00600) ²	mg/L	1/Week	Calculate	0.1	Mo Avg
Total Nitrogen, as N (00600) ²	lbs/day	1/Week	Calculate	--	Mo Avg
Total Phosphorus (00665)	mg/L	1/Week ³	Grab	3	Mo Avg
Total Phosphorus (00665)	lbs/day	1/Week ³	Calculate	--	Mo Avg
Temperature, Effluent (00011)	°F	Continuous	Recording Device	0.1	Daily Max
Instream Temperature Increase (03772)	°F	1/Day	Calculate ⁴	0.1	Daily Max & Mo Avg
Whole Effluent Toxicity Chronic, <i>Ceriodaphnia</i> 7-Day, Static Renewal (TCP3B)	Percent Effluent	1/Quarter	Composite	Per Method	Pass/Fail
Whole Effluent Toxicity Chronic, <i>Pimephales</i> 7-Day, Static Renewal (TCP6C)	Percent Effluent	1/Quarter	Composite	Per Method	Pass/Fail

¹ In cases where the required reporting value (RRV) in DEQ-7 is greater than the effluent limitation, analytical results less than or equal to the RRV will be considered to be in compliance with the limit.

² Total Nitrogen is calculated as the sum of TKN and nitrate + nitrite.

³ Total Phosphorus monitoring is seasonal and is required only during July 1st – September 30th.

⁴ See Part I.D.4 of the Permit for information on calculating temperature increase.

Table 26. Monitoring requirements at monitoring location 002A

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV)¹	Reporting Requirement
Effluent Flow Rate (00056)	mgd	Continuous	Recording Device	--	Daily Max & Mo Avg
pH (00400)	s.u.	1/Day	Instantaneous	0.1	Daily Min & Daily Max
Total Suspended Solids (00530)	mg/L	3/Week	Grab	1	Daily Max & Mo Avg
Cadmium, Total Recoverable (01113)	µg/L	1/Month	Grab	0.03	Daily Max & Mo Avg
Chromium, Total Recoverable (01034)	µg/L	1/Month	Grab	10	Daily Max & Mo Avg
Copper, Total Recoverable (01119)	µg/L	1/Month	Grab	2	Daily Max & Mo Avg
Iron, Total Recoverable (00980)	µg/L	1/Month	Grab	20	Daily Max & Mo Avg
Lead, Total Recoverable (01114)	µg/L	1/Month	Grab	0.3	Daily Max & Mo Avg
Mercury, Total Recoverable (71901)	µg/L	1/Month	Grab	0.005	Daily Max & Mo Avg
Nickel, Total Recoverable (01074)	µg/L	1/Month	Grab	2	Daily Max & Mo Avg
Zinc, Total Recoverable (01094)	µg/L	1/Month	Grab	8	Daily Max & Mo Avg
Nitrate + Nitrite (as N) (00630)	mg/L	1/Week	Grab	0.2	Daily Max & Mo Avg
Total Inorganic Nitrogen (TIN) (00640) ²	mg/L	1/Week	Grab	0.01	Daily Max & Mo Avg
Total Kjeldahl Nitrogen (TKN) (00625)	mg/L	1/Week	Grab	0.1	Mo Avg
Total Nitrogen, as N (00600)	mg/L	1/Week	Calculate	0.1	Mo Avg
Total Nitrogen, as N (00600)	lbs/day	1/Week	Calculate	--	Mo Avg

¹ In cases where the required reporting value (RRV) in DEQ-7 is greater than the effluent limitation, analytical results less than or equal to the RRV will be considered to be in compliance with the limit.

² Total Inorganic Nitrogen is calculated as the sum of ammonia, as N plus nitrate + nitrite, as N; and Total Nitrogen is calculated as the sum of TKN and nitrate + nitrite, as N.

Table 27. Monitoring requirements at monitoring location SUM (001A + 002A)

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV)	Reporting Requirement
Total Inorganic Nitrogen (00640) ¹	lbs/day	1/Month	Calculate	--	Daily Max & Mo Avg.
Total Nitrogen, As N (00600) ²	lbs/day	1/Month	Calculate	--	Daily Max & Mo Avg.
Copper, Total Recoverable (01119)	lbs/day	1/Month	Calculate	--	Mo Avg
Iron, Total Recoverable (00980)	lbs/day	1/Month	Calculate	--	Mo Avg
Lead, Total Recoverable (01114)	lbs/day	1/Month	Calculate	--	Mo Avg

¹ Total Inorganic Nitrogen is calculated as the sum of ammonia, as N plus nitrate + nitrite, as N.
² Total Nitrogen is calculated as the sum of TKN and Nitrate + Nitrite.

Table 28. Monitoring requirements at monitoring location 003A

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV)	Reporting Requirement
Effluent Flow Rate (00056)	gpd	Daily	--	--	Monthly Avg
Biochemical Oxygen Demand (BOD ₅) (00310)	mg/L	1/Quarter	Grab	2	Quarterly Avg
Total Suspended Solids (00530)	mg/L	1/Quarter	Grab	1	Quarterly Avg
Nitrate + Nitrite (as N) (00630)	mg/L	1/Quarter	Grab	0.2	Quarterly Avg
	lbs/day	1/Quarter	Calculate	--	Quarterly Avg
pH (00400)	su	1/Quarter	Grab	0.1	Quarterly Min & Max

Table 29. Monitoring requirements at monitoring location 001U

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV)	Reporting Requirement
Temperature, Water (00011)	°F	Continuous	Recording Device	0.1	Document ¹

¹ Monitoring data used to calculate instream temperature increase required for Outfall 001

Table 30. Monitoring requirements at monitoring location 001D

Parameter and Code	Units	Minimum Monitoring Frequency	Sample Type	Required Reporting Value (RRV)	Reporting Requirement
Temperature, Water (00011)	°F	Continuous	Recording Device	0.1	Document ¹

¹ Monitoring data used to calculate instream temperature increase required for Outfall 001

4 SPECIAL CONDITIONS

Special conditions are included in MPDES permits when necessary to provide for and assure compliance with additional requirements of the MWQA or federal CWA and applicable regulations on a case-by-case basis. ARM 17.30.1344. Special conditions include, but are not limited to, collection of additional data, studies or supplemental monitoring, preventative measures, best management practices (BMPs), compliance schedules, ground water protection, programmatic conditions such as pretreatment, sewage sludge or sewer overflow, or toxicity studies. This section provides the rationale for the special conditions included in the permit.

4.1 Toxicity Identification Evaluation (TIE)/Toxicity Reduction Evaluation (TRE)

The permit has established monitoring requirements for chronic toxicity. The permit also includes a provision to develop and implement a TIE/TRE plan when monitoring indicates effluent toxicity as defined in the permit occurs.

4.2 Best Management Practices (BMPs)

The permit application states that treated mine wastewater may be discharged to land application sites utilizing spray irrigation or snowmaking during winter months. The Permittee has submitted a conceptual *Water Management Plan East Boulder Project* (June 1998: Received March 10, 2006) and *Review of Snowmaker Water Treatment Efficiency* (June 2, 2004) that demonstrates nitrogen loss during snowmaking and subsequent physical and chemical processes. Seasonal irrigation of treated mine wastewater containing nutrients and metals reduces the volume of wastewater discharged to surface or ground water. The Permittee has identified several potential sites for land application at the Facility. Wastewater transferred off-site is not regulated under this permit.

ARM 17.30.1344(2) and 40 CFR 122.44(k), adopted by reference, authorize the use of BMPs in MPDES permits when numeric effluent limitations are infeasible or when BMPs are necessary to achieve limitations or carry out the purpose of the CWA or MWQA.

The BMP program developed by the Permittee must conform to EPA's *Guidance Manual for Developing Best Management Practices (BMP)*, EPA 833-B-93-004, October 1993, or equivalent.

The permit establishes the requirement that the Permittee develop and implement a BMP program that achieves the objectives and specific requirements listed below. The BMP program must be implemented as soon as possible, but no later than nine months from the effective date of the permit. The purpose of the program is to control runoff from land application areas and minimize nitrogen and metals levels in soils and ground water.

The BMP program shall be developed in accordance with good engineering practices and designed to achieve the stated objectives in this section. The objectives of the BMP program are as follows:

- a. The application of treated wastewater to land application sites during the growing season must occur at a rate consistent with agronomic uptake of nitrogen.

- b. The application of treated wastewater to land application sites must be managed to prevent ponding of wastewater on land application sites and prevent or eliminate the discharge of pollutants from land application sites to state waters.
- c. Snowmaking activities must be conducted in a manner which maximizes chemical and physical processes that reduce or eliminate nitrogen content of the snow and minimize any discharge of pollutants to state waters.
- d. Snowmaking and seasonal irrigation sites shall maintain appropriate buffer zones between any downgradient or downslope surface waters, open tile intake structures, sinkholes, agricultural well heads, or other conduits to surface waters.
- e. The Permittee must monitor and maintain records regarding the daily and total volume, area, quality, rate of application to the land application site(s), and routine inspection of the land application sites.

4.3 Wastewater Facility Optimization Study

Facilities that receive a nutrient variance must evaluate current facility operations to optimize nutrient reduction with existing infrastructure and analyze other cost-effective methods of nutrient load reductions. Circular DEQ-12B allows for flexibility regarding the scope and content of the study but requires that the optimization study includes, but is not limited to, an assessment of nutrient trading feasibility within the watershed without substantial investment in new infrastructure. DEQ may request the permittee provide the results of the optimization study/nutrient reduction analysis within two years of receiving the variance.

This permit requires the completion of an optimization study/nutrient reduction analysis including an assessment of trading with a two year compliance schedule, as summarized in **Table 31** below.

Table 31: Compliance Schedule

Action	Frequency	Scheduled Completion Date of Action ⁽¹⁾	Report Due Date ⁽²⁾
Complete a Facility Optimization Study	Single Event	No Later than Two Years from the Effective Date of the Permit	NA
Submit Notification that the Facility Optimization Study is Complete	Single Event	No Later than Two Years from the Effective Date of the Permit	No Later than the 28 th of the Month Two Years from the Effective Date of the Permit
Footnotes: NA = Not Applicable (1) The actions must be completed on or before the scheduled completion dates. (2) This notification must be received by the DEQ on or before the scheduled due date.			

Circular DEQ-12B encourages optimization studies include, but are not be limited to, facility operations and maintenance, reuse, recharge, and land application. However, DEQ-12B clarifies that the changes to facility operations resulting from the analysis carried out are only intended to be refinements to the wastewater treatment system already in place, addressing changes to facility operation and maintenance. Optimizations are not intended to include changes to the facility resulting in structural modification, user rate increases, or substantial capital investment.

4.4 Ambient Monitoring - Temperature

The Permittee must install, operate and maintain a temperature monitoring device that records instream temperature at a minimum of 15-minute intervals and can report daily average temperature (**Table 32**). The temperature difference (ΔT) is determined by subtracting the downstream average daily temperature (T_d) from the upstream average daily temperature (T_u). The temperature difference (ΔT) shall be reported on the DMR for Outfall 001.

Table 32. Ambient temperature monitoring requirements

Location	Parameter	Units	Minimum Monitoring Frequency	Sample Type	Minimum Level
001U—Upstream	Temperature, Water (T_u).	°F	Continuous	Recording Device	0.1
001D—Downstream	Temperature, Water (T_d)	°F	Continuous	Recording Device	0.1

The Permittee must develop a protocol to implement this monitoring requirement. Instream monitoring is only required when effluent is discharged to the East Boulder River through Outfall 001. Instream monitoring must commence at least 48 hours prior to discharge and continue for at least 96 hours after cessation of the discharge. Ambient temperature monitoring is subject to the monitoring and record keeping requirements in this permit, but is not required to submit the data in DMR forms.

4.5 Ground Water Monitoring

Existing monitoring wells (WW-1, MW-2, MW-3, MW-6, MW-7, MW-8, and MW-9) will remain as monitoring locations in this permit, but will not be used for compliance determination since permit effluent limits have been removed. The Facility will conduct quarterly monitoring at these seven monitoring wells, at a minimum. The quarterly monitoring data will be submitted on DMRs, due the 28th of the month following the monitoring period.

Table 33. Ground Water Monitoring

Parameter	Units	Frequency	Type
Static Water Level	ft. below ground surface	Quarterly	Grab
pH	SU	Quarterly	Grab
Specific Conductance	umhos/cm	Quarterly	Grab
Ammonia, as N	mg/L	Quarterly	Grab
Nitrate + Nitrite, as N	mg/L	Quarterly	Grab
Total Inorganic Nitrogen	mg/L	Quarterly	Calculated ¹
1 Total Inorganic Nitrogen is the sum of ammonia, as N and nitrate + nitrite.			

4.6 Compliance Schedules

The permit imposes new or more stringent WQBELs for several pollutants at Outfalls 001 and 002. A compliance schedule to allow the permittee to assess the need for and develop any additional treatment that may be necessary is included in the permit. The final WQBELs shall be effective 58 months after the permit effective date. The Facility must meet the interim limit set forth in East Boulder River.

Because the final WQBELs at Outfall 001 and 002 are based on conservative assumptions regarding ground water to surface water interaction, the permittee may conduct additional ground water/surface water studies to address the continued need for, or to request modifications of, the final WQBELs. Options available to the permittee include, but are not limited to, more accurately characterizing the effluent quality for the parameters limited by the WQBELs, conducting new studies to more accurately determine the quantity and location of effluent discharge from ground water to surface water, conducting surface water quality assessments and mixing zone studies relevant to the discharges from Outfall 001 and 002, and requesting permit modification to incorporate the findings of these studies into the final WQBELs.

The permit requires the permittee to submit an annual report of progress towards compliance with the final WQBELs, or towards the submission of a request to modify the final WQBELs. Should the permittee choose to apply for a modification of the final WQBELs, such a request must be submitted to DEQ no later one year prior to the effective date of the final WQBELs. The permittee is encouraged to coordinate all activities with DEQ, prior to their initiation.

5 STANDARD CONDITIONS

Standard conditions must be included in all MPDES permits and the Permittee must comply with all standard conditions at all times. ARM 17.30.1342. These requirements are expressly incorporated into Part 5 of the permit. In addition to these requirements, ARM 17.30.1343 and 40 CFR 122.42 establishes additional conditions applicable to specific categories of MPDES permits including: notification requirements for municipal and non-municipal dischargers, reporting requirements for municipal separate storm sewer systems, compliance requirements for individual storm water permits, and additional requirement for concentrated animal feeding operations.

The Facility is an existing industrial discharger, and, therefore, has the additional requirement of ARM 17.30.1343(a) which are included in Part 5 of the permit. The requirement establishes additional notification requirements for toxic pollutants that exceed a specified level, exceed the level given in the Facility's permit application, or are not regulated in the permit.

6 PUBLIC PARTICIPATION

In accordance with ARM 17.30.1372, DEQ issued Public Notice No. MT-15-39, dated July 31, 2015. The public notice states that a tentative decision has been made to issue an MPDES permit for Stillwater East Boulder Mine, and that a draft permit, fact sheet and environmental assessment (EA)

have been prepared. Public comments are invited any time prior to the close of the business August 31, 2015. Comments may be directed to:

DEQ Permitting and Compliance Division
Water Protection Bureau
PO Box 200901
Helena, MT 59620

or DEQWPBPublicNotices@mt.gov

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments and issue a final decision within sixty days of the close of the public comment period, or as soon as possible thereafter.

All persons, including applicants, who believe any condition of a draft permit is inappropriate, or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing) under ARM 17.30.1372.

6.1 Notification of Interested Parties

Copies of the public notice were mailed to the Permittee, state and federal agencies and interested persons who have expressed in interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this permit. In addition to mailing the public notice, a copy of the notice and applicable draft permit, fact sheet and EA were posted on DEQ website for 30 days.

Any person interested in being placed on the mailing list for information regarding this MPDES Permit should contact DEQ, reference this Facility, and provide a name, address, and phone number.

6.2 Public Hearing Written Comments

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing (ARM 17.30.1374).

6.3 Permit Appeal

After the close of the public comment period DEQ will issue a final permit decision. A final permit decision means a final decision to issue, deny, modify, revoke and reissue, or, terminate a permit. A permit decision is effective 30 days after the date of issuance unless a later date is specified in the decision, a stay is granted pursuant to ARM 17.30.1379, or the applicant files an appeal pursuant to 75-5-403, MCA.

The Applicant may file an appeal within 30 days of DEQ's action to the following address:

Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
PO Box 200901
Helena, Montana 59620-0901

6.4 Additional Information

Requests for additional information or questions regarding this permit should be directed to the Water Protection Bureau at (406) 444-3080.

7 NONSIGNIFICANCE DETERMINATION

The Montana Water Quality Act states that it is unlawful to cause degradation of state waters without an authorization issued pursuant to 75-5-303, MCA [75-5-605(1)(d), MCA]. ARM 17.30.706(2) states that DEQ will determine whether a proposed activity may cause degradation for all activities which are permitted, approved licensed or otherwise authorized by DEQ, such as issuance of a discharge permit. A nondegradation review was conducted in **Section 2** of this permit fact sheet for the proposed discharges and activities regulated by this permit. Based on this analysis, DEQ has made the following determinations.

Outfall 001

Effluent limits and conditions established in the permit for the discharge to Outfall 001 are based on the criteria of ARM 17.30.715 (Criteria for Determination of Nonsignificant Changes in Water Quality) for surface water. Therefore, any discharge in compliance with these limitations is nonsignificant based on Montana's nondegradation rules and policy (75-5-303, MCA). Any change in water quality resulting from these discharges is considered nonsignificant provide that the Permittee is in compliance with the effluent limits and conditions of the permit.

Outfalls 002 & 003

Effluent limits and conditions established in the permit for the discharge to Outfall 002 are based on with the criteria of ARM 17.30.715 (Criteria for Determination of Nonsignificant Changes in Water Quality) for both surface and ground water. Therefore, any discharge in compliance with these limitations is nonsignificant based on Montana's nondegradation rules and policy (75-5-303, MCA). Any change in water quality resulting from these discharges is considered nonsignificant provided that the Permittee is in compliance with the effluent limits and conditions of the permit.

Degradation of surface and ground water from sources not authorized to discharge by this permit are not addressed by this determination.

FIGURE 1— EAST BOULDER MINE LOCATION OF MONITORING SITES

APPENDIX 1—WATER QUALITY STANDARDS

In **Table 1.A**, water quality standards for relevant conventional and nonconventional pollutants and toxic parameters are provided.

Table 1.A Water Quality Standards for the East Boulder River

Pollutant or Parameter	Units	Acute Water Quality Standard (S _A)	Chronic Water Quality Standard (S _C)	Human Health Water Quality Standard (S _H)	Nondegradation Category	Nondegradation Criterion (S _N) or Not Applicable (NA)
Conventional and Nonconventional Pollutants						
Temperature, change	°	1° increase or 2° decrease			Harmful	No change
pH, change	SU	0.5 increase or decrease			Harmful	No change
Ammonia ¹	mg/L	4.64	2.10	--	Toxic	0.32
Nitrate+ Nitrite	mg/L	--	--	10	Toxic	1.5
Total Nitrogen	mg/L	--	0.300	--	Harmful	0.12
Total Phosphorus	mg/L	--	0.03	--	Harmful	0.012
Iron, Total Recoverable	mg/L	--	1	--	Harmful	0.40
Toxic Parameters						
Cadmium, Total Recoverable ²	µg/L	1.05	0.16	5	Toxic	0.024
Chromium, Total Recoverable	µg/L	---	---	100	Toxic	15
Copper, Total Recoverable ²	µg/L	7.3	5.2	1,300	Toxic	0.78
Lead, Total Recoverable ²	µg/L	34	1.3	15	Toxic	0.195
Mercury, Total Recoverable	µg/L	1.7	0.91	0.05	Toxic w/ BCF > 300	0.005
Nickel, Total Recoverable ²	µg/L	261	29	100	Toxic	4.35
Zinc, Total Recoverable ²	µg/L	67	67	2,000	Toxic	10
¹ Based on 75 th percentile of 8.1 s.u. and 5.5° Celsius.						
² Based on 50 mg/L hardness.						

Nonsignificance Criteria

For sources subject to nondegradation criteria described in **Section 2.2.6**, WQBELs must be set for any new or increased source to protect existing water quality unless the change is nonsignificant or an authorization to degrade state waters pursuant ARM 17.30.706-708 has been issued. As defined in ARM 17.30.702, existing water quality is defined as the quality of the receiving water immediately prior to commencement of the activity or that which can adequately be demonstrated to have existed on or after July 1, 1971, whichever is the highest quality. A new or increased source is an activity resulting in a change of existing water quality occurring on or after April 29, 1993.

The Facility was constructed after 1993 and is considered a new or increased source. In developing this permit renewal, DEQ considered the following:

- *Outfall 001*: The previous effluent limits for Outfall 001 were based on ensuring nonsignificant changes pursuant to ARM 17.30.715. The discharge flow rate has not increased (in fact the flow has decreased from 1.1 mgd to 0.72 mgd) and the Facility is not an increased source. For this renewal, the most stringent of the nonsignificance levels determined in the 2000 permit and current WQBELs are proposed as the Outfall 001 effluent limits.
- *Outfall 002*: The previous permit failed to evaluate nonsignificance for discharges through the ground water to East Bolder River from Outfall 002. For this renewal, DEQ conducted RP analysis and developed WQBELs based on nonsignificance for this outfall. The only criterion for nonsignificant changes that is relevant for this permit is 15% of the applicable standard for toxic pollutants based on the East Boulder River [ARM 17.30.715(1)(c)].

Appendix 5 contains additional discussion on the application of nondegradation criteria as instream water quality objectives

APPENDIX 2—RECEIVING WATER CHARACTERISTICS

Where receiving water quality data is available, it may be used in the development of water quality-based effluent limitations (WQBEL). In the absence of receiving water quality and quantity, effluent limits are based on meeting the applicable standard, that is, no assimilative capacity is assumed. All receiving water data used to support development of WQBEL must meet the data quality objectives and assessment criteria established in DEQ's Quality Management Plan (November, 2014). This Appendix describes the process used to determine the receiving water concentration or value for purposes of developing WQBELs.

Receiving water quality should be based on samples collected at design conditions, this is, the critical stream flow (Q_s) as described in **Section 2.2**. Because Q_s is an infrequent event and data is not typically available, the background concentration (C_s) must be estimated based on water quality data that is collected outside of this flow condition. To account for the uncertainties in estimating background data, DEQ uses the upper and lower quartiles of the sample data. The upper quartile is defined as the 75th percentile of the measured or observed data and the lower quartile is the 25th percentile of the same data set. To account for the variability of the receiving water, a minimum of 10 data points or measurements must be available and representative of the range of hydrologic conditions in the receiving water. Data used in this analysis must be collected upstream of the point of discharge for flowing waterbodies or outside of the influent of the discharge for non-flowing waterbodies.

For most constituents, the critical background concentration is defined to be the upper quartile of the sample data for purposes of a reasonable potential analysis and determining assimilative capacity in calculating wasteload allocations (WLA) (Appendix 5). In some cases, including application of the nondegradation criteria in ARM 17.30.715(1), changes in existing water quality or the water quality standard is expressed relative to the background concentration in the receiving water. In these situations the WLA is based on the lower bound estimate of the interquartile range (25th percentile value) to maintain the existing water quality of the receiving water. Additional details on developing WLAs and WQBELs based on these estimates are given in Appendix 5.

Data Source and Data Quality Assessment

Receiving water characteristics for the East Boulder River and associated ground water are described in **Tables 2.A** and **2.B**, respectively. These data are derived from several sources, as specified in the tables:

1. *EBR3*: Ongoing ambient monitoring at surface water locations as a condition of the 2000 MPDES permit. The period of record for this data is December 31, 2000, through March 31, 2013. The surface water data in **Table 2.A** was collected at river monitoring sites EBR3.
2. *2015 Data*: Data submitted by the permittee on March 30, 2015, derived from the surface and ground water monitoring required by the Facility's Metal Mine Reclamation Act (MMRA) operating permit. Routine analytical monitoring under the MMRA permit does not use analytical methods that are sufficiently sensitive to assess changes in water quality at nondegradation levels. Due to the lack of baseline data for metals at lower detection and quantification levels, the Permittee requested that the analytical laboratory re-examine the existing metals data to determine if a lower reporting level could be reported.

3. *EIS*: Baseline data used to prepare the East Boulder Mine Project Final Environmental Impact Statement (FEIS) (Prepared by Montana DEQ of State Lands, et al, May 1992) as part of the pre-mine baseline studies. Data from this period represents the existing water quality, as defined in ARM 17.30.702 for the East Boulder River. However, this data and most of the metals monitoring data range from one to three orders of magnitude above the required reporting values given in DEQ Circular DEQ-7 and therefore is not useful for determining existing water quality.
4. *WW-1*: Ground water monitoring at ambient well WW-1 was required as part of the 2000 Permit.

Additional ground water data that was required by the MPDES permit from down gradient monitoring wells for compliance purposes is summarized in **Section 2.2.4**.

Critical Background Concentration (C_s) – Method of Determination

To estimate the value of C_s , the critical background receiving water pollutant concentration as described in **Section 2.2** (Design Conditions), the following procedure is applied.

1. Reported data must use an approved method of analysis (40 CFR 136) and achieve the required reporting value (RRV) in DEQ Circular DEQ-7, or achieve a level of analysis that is at least 1/10 of the lowest applicable water quality standard.
2. Reject data which has not achieved the applicable level of analysis in Step 1 or other QA/QC objectives.
3. Determine if there is sufficient data to characterize the receiving water. This data must represent the annual range of variation, generally 10 or more data points.
4. Determine the 25th percentile value ($C_{.25}$) of the data set
5. Determine the 75th percentile value ($C_{.75}$) of the data set

Where there is insufficient data for a parameter, generally less than 10 data points, C_s is undetermined and reported as (“U”). In this case, RPA and WLA/WQBEL are based on meeting the applicable water quality standard or nondegradation criteria at the end of pipe (no receiving water dilution).

Where there are 10 or more data points, for pollutants with a numeric water quality standard or non-significance criterion expressed as an *absolute value* (e.g. numeric criterion or standard):

1. If $C_{.75}$ is a quantified value (i.e. not reported as less than detect), the background concentration (C_s) is estimated by $C_{.75}$
2. If $C_{.75}$ is a non-quantified value (NQV), i.e. reported as less than detect, and if the water quality standard or applicable nondegradation criterion is less than the NQV, set $C_s = WQS$ (no assimilative capacity).
3. If $C_{.75}$ is a NQV and if $RRV < \text{water quality standard}$, set $C_s = NQV$.

For pollutants with a water quality standard or non-significance criterion expressed as a *relative value* (e.g. increase above background) based on background concentration and where ≥ 10 data points are available:

1. If $C_{.25}$ is a quantified value, then $C_s = C_{.25}$
2. If $C_{.25}$ is a NQV, then $C_s = NQV$.

For parameters with nondegradation criterion expressed as a relative value and a numeric water quality standard expressed as an absolute value, this method may only be applied if the value determined by $C_{.25}$ is less than the applicable water quality standard.

Table 2.A Receiving water characteristics for the East Boulder River

Parameter	Units	Required Reporting Value (RRV)	Lower Quartile (C ₂₅)	Upper Quartile (C ₇₅)	Number of Samples	Comment
Conventional and Nonconventional Pollutants						
Flow, mean monthly	cfs	--	7.8	44.7	44	EBR3
Temperature, annual	°F	0.1	35.0	41.9	41	2015 Data
pH	SU	0.1	7.7	8.1	41	2015 Data
Ammonia	mg/L	0.07	<0.05	<0.05	50	EBR3
Nitrate+ Nitrite	mg/L	0.02	0.05	0.09	50	EBR3
Total Nitrogen	mg/L	0.07	0.14	0.3	50	EBR3
Total Phosphorus	mg/L	0.003	0.005	0.010	50	EBR3
Hardness, Total, as CaCO ₃	mg/L	10	50	105	12	2015 Data
Iron, Total Recoverable	mg/L	0.02	0.027	0.105	16	2015 Data
Toxic Pollutants						
Cadmium, Total Recoverable	µg/L	0.03	<0.03	<0.03	24	2015 Data
Chromium, Total Recoverable	µg/L	10	<1	<1	33	2015 Data
Copper, Total Recoverable	µg/L	2	<1	<1	33	2015 Data
Lead, Total Recoverable	µg/L	0.3	<0.3	<0.3	22	2015 Data
Mercury, Total Recoverable	µg/L	0.005	<0.005	<0.005	4	2015 Data
Nickel, Total Recoverable	µg/L	2	<2	<2	25	2015 Data
Zinc, Total Recoverable	µg/L	8	<5	<5	25	2015 Data

Table 2.B Receiving water characteristics for ground water

Parameter	Units	Required Reporting Value (RRV)	Lower Quartile (C ₂₅)	Upper Quartile (C ₇₅)	Number of Samples	Comment
Conventional and Nonconventional Pollutants						
pH	SU	0.1	7.9	8.0	4	EIS
Ammonia	mg/L	0.07	<0.1	<0.1	4	EIS
Nitrate+ Nitrite	mg/L	0.02	0.1	0.13	4	EIS
Total Nitrogen	mg/L	0.07	<0.1	<0.1	4	EIS
Total Phosphorus	mg/L	0.003	<0.01	<0.01	4	EIS
Hardness, Total, as CaCO ₃	mg/L	10	90	121	4	EIS
Iron, Dissolved	mg/L	0.02	<0.03	0.03	25	WW-1
Toxic Pollutants						
Cadmium, Dissolved	µg/L	0.03	<0.03	<0.03	29	WW-1
Chromium, Dissolved	µg/L	10	<1	<1	25	WW-1
Copper, Dissolved	µg/L	2	<1	<1	25	WW-1
Lead, Dissolved	µg/L	0.3	<0.3	<0.3	29	WW-1
Mercury, Dissolved	µg/L	0.005	<0.01	<0.02	24 ¹	WW-1
Nickel, Dissolved	µg/L	2	<2	<2	29	WW-1
Zinc, Dissolved	µg/L	8	<8	<13	29	WW-1

¹ Mercury results were nondetect; however, only two samples had a detection limit that met the mercury RRV of 0.005 ug/L.

APPENDIX 3—EFFLUENT CHARACTERISTICS

The Permittee must provide quantitative data on certain pollutants in the effluent (ARM 17.30.1322). This information is used to determine if effluent limitations, in addition to TBEL described in **Section 2.1**, are necessary. Effluent characterization is based on the daily discharge data for the effluent which is summarized as monthly average and daily maximum values. For existing facilities this data must be based on the previous 3-5 years and represent the current operation of the facility.

CRITICAL EFFLUENT FLOW (Q_d)

Effluent flow is a measure of the average daily flow expected to occur over the next five-year permit cycle or effective life of the regulated Facility or activity. Stillwater provided the following flow data:

Table 3.A Summary of Effluent Flow Data

	Average		Maximum 30-Day Avg	Maximum	
	gpm	mgd	mgd	gpm	mgd
2000 Permit	737	1.1	1.1	1105	1.6
2005 Permit Application	350	0.5			
DMR May 2005 – May 2015	111	0.16	0.43	705	1.0
May 2015 Request	500	0.72			

For purposes of developing WQBEL for both outfalls, the critical effluent flows used in RP and WQBEL calculations, in millions of gallons per day (mgd) are summarized in **Table 3.B**.

Table 3.B Critical effluent flow

Outfall	Critical Effluent Flow	Information Source/Period of Record
001 or 002	0.72 mgd	March 30, 2015 Supplemental Request

CRITICAL EFFLUENT POLLUTANT CONCENTRATION (C_d)

For purposes for determining reasonable potential and assessing the need for a WQBEL, DEQ calculates a reasonable measure of the critical (maximum) effluent pollutant concentration (C_d) accounting for the variability of the effluent as determined by the coefficient of variation (CV) and sample size. This procedure accounts for the variability of the effluent as required in 40 CFR 122.44(d). Due to the non-normal distribution of most effluents and low sample frequency (small sample size), DEQ estimates C_d based on the 95th percentile of the expected effluent concentration following procedure described in Chapter 3 of EPA's *Technical Support Document for Water Quality Based Toxic Control*, EPA/505/2-90-001, March 1991 (TSD). The critical effluent pollutant concentration is based on the estimated 95th percentile value (**Equation 3.A**):

$$C_d = C_{d(max)} * \text{RPMF} \quad \text{Equ. 3.A}$$

Where: $C_{d(max)}$ = Maximum Daily value, **Table 3.C**
 RPMF = Reasonable Potential Multiplying Factor (RPMF), Table 3-2, TSD

Estimating the CV requires that the standard deviation be calculated using the actual measured daily discharge values. In most cases, individual daily discharge values are not reported on the discharge monitoring reports (DMR). Where daily discharge values are not available, DEQ assumes a CV of 0.6. For parameters for which a CV of 0.6 was assumed, a RPMF of 1.0 was used for sample sizes greater than 60. The critical effluent concentration is used in the reasonable potential analysis.

FACILITY EFFLUENT CHARACTERISTICS

Effluent characteristics as reported in the 2005 Facility permit application are summarized in **Table 3.C**. The same effluent concentration is reported for both Outfall 001 & 002 since no discharge has occurred from Outfall 001 and the source of the effluent and treatment systems are identical according to the application.

The 2005 application contained limited effluent data for metals. All of the reported metal values were based on dissolved (filtered) samples. Metal samples are required to be analyzed as total recoverable data as required by ARM 17.30.1322 and 1345. In addition, the metal data did not comply with the required reporting values given in Circular DEQ-7 or other sufficiently sensitive detection levels. Data analyzed at the higher detection level was reported at one-half of the detection limit by the Permittee.

The March 30, 2015, supplemental effluent data was also based on dissolved samples, in order to mimic the future effluent quality anticipated after the installation of a planned 2015 control technology upgrade (including a 10-micron filter). The 2015 data was collected by the Permittee under the Facility's MMRA permit. At the request of the Permittee, the commercial laboratory that originally performed the analyses re-evaluated the data to determine if a lower detection limit could be reported. The re-evaluated data is summarized in **Table 3.C** as "dissolved."

Table 3.C Facility effluent characteristics for Outfalls 001/002

Parameter	Units	Maximum Daily	Average	Number of Samples (n)	Coefficient of Variation (CV)	Multiplying Factor (RPMF)	Critical Effluent Conc. (C _d)
Conventional and Nonconventional Pollutants							
Flow	mgd	1.0	0.1	188	NA	NA	NA
Temperature, winter	°F	61	52	NR	--	--	61
Temperature, summer	°F	70	60	NR	--	--	70
pH, maximum	SU	8.3	NA	188	--	--	9.0
pH, minimum	SU	7.1	NA	188	--	--	6.0
Ammonia	mg/L	32.3	11.4	176	0.6	1	32
Nitrate+ Nitrite	mg/L	32	3.03	69	0.6	1	32
Nitrogen, Total Inorganic	mg/L	76	10	176	0.6	1	76 ¹
Total Phosphorus	mg/L	0.22	0.01	176	0.6	1	0.22
Sulfate	mg/L	330	84	73	0.6	1	330
Iron, Dissolved ²	mg/L	0.89	0.047	96	0.6	1	0.89
Toxic Pollutants²							
Cadmium, Dissolved	µg/L	0.12	<0.05	43	0.6-	1	0.12
Chromium, Dissolved	µg/L	3	<1	82	0.6	1	3
Copper, Dissolved	µg/L	4	<1.1	81	0.6	1	4
Lead, Dissolved	µg/L	3.6	<0.46	39	0.6	1	3.6
Mercury, Dissolved	µg/L	<0.005	--	2 ³	0.6	1	0.005
Nickel, Dissolved	µg/L	93	12	63	0.6	1	93
Zinc, Dissolved	µg/L	110	<11	41	0.6	1	110

¹ The Facility was not required to provide Total Nitrogen concentration data as part of the previous permit. For purposes of conducting RP, Total Inorganic Nitrogen will be used.

² Effluent samples were filtered through 10-micron filter prior to analysis, in order to simulate the effluent quality after treatment by a 10-micron filtration unit proposed to be installed in 2015 as part of the wastewater treatment.

³ All mercury results were nondetect; however, although there were 11 mercury samples, only two analyses met the RRV of 0.005 µg/L.

Flow - Nondegradation

Flow is not a pollutant subject to regulation under state or federal regulations. However, Montana water quality standards have adopted flow requirements under ARM 17.30.715 for high quality waters.

The 2000 permit determined that a 15 percent increase in receiving water flow would be nonsignificant. The permit therefore determined that the maximum allowable discharge flow at Outfall 001 would be 15 percent of the average monthly flow of the East Boulder River (42.7 cfs), which is 6.4 cfs (4.1 mgd). The 2000 permit included a 30-day average and maximum daily flow limitations that were below this flow rate. DEQ has removed the flow limit. The permit will require continuous flow monitoring for both Outfalls.

APPENDIX 4—REASONABLE POTENTIAL ANALYSIS

When determining the need for WQBELs, DEQ uses estimates of critical effluent concentration and flow (Appendix 3) and the design conditions of the receiving water after accounting for any dilution (mixing zone). The resulting instream pollutant concentration is compared to the applicable water quality standard or nondegradation criterion. For purposes of assessing the need for and calculating WQBELs, DEQ uses the mass-balance equation given by **Equation 4 (Section 2.2.8)**. The mass balance equation assumes steady-state conditions of discharge and receiving water, rapid and complete mixing and is based on the design condition of the receiving water. The mass-balance equation is used to determine the concentration of a pollutant after accounting for the dilution provided by a mixing zone. The mass-balance equation can be arranged to solve for the resulting instream pollutant concentration (C_R) in the receiving water after accounting for dilution and other sources of pollution.

$$C_R = (Q_S C_S + Q_D C_D) / (Q_R)$$

Where:

Q_S	=	critical stream flow available for dilution
C_S	=	critical background receiving water pollutant concentration
Q_D	=	critical effluent flow
C_D	=	critical effluent pollutant concentration
Q_R	=	resultant in-stream flow after discharge ($Q_R = Q_S + Q_D$).

This equation also may be expressed in terms of the chronic (D_C) or acute (D_A) dilution ratio provided by a mixing zone.

$$C_R = (C_D + (D \times C_S)) / (1 + D)$$

Where: D = acute (D_A) or chronic (D_C) dilution ratio.

If a mixing zone has not been granted, or there is no assimilative capacity for a specific parameter, the dilution factor is '0' for that parameter. Dilution ratios are discussed in **Section 2.2.7**.

RPA results are given in **Tables 4.A** and **4.B** for Outfalls 001 and 002 respectively, and are discussed in **Section 2.2.8**. Where the resulting pollutant concentration (C_R) exceeds the applicable water quality standard or nondegradation criterion, there is RP to exceed and a WQBEL is required for that parameter and must be included in the permit.

In addition, WQBELs will be calculated in **Tables 5.A.** and **5.B.** for those parameters where background or effluent detection limits were insufficient to determine RP but have TBELs: cadmium, copper, lead, and mercury.

Table 4.A Reasonable Potential Analysis for Outfall 001 to East Boulder River

Parameter	Units	Acute Water Quality Standard (S _a)	Chronic/HH Criterion (S _c)	Critical Effluent Conc. (C _d)	Critical Background Receiving Water Conc. (C _s)	Acute Dilution Factor (D _a)	Chronic Dilution Factor (D _c)	Projected Receiving Water Conc. Acute (C _{Ra})	Projected Receiving Water Conc. Nondeg. (C _{Rc})	WQBEL Needed Based on RPA?
Ammonia	mg/L	4.6	0.32 ¹	32	0.05	0.45	4.5	22.1	5.9	Y
Nitrate + Nitrite	mg/L	--	10	32	0.09	--	4.5	--	5.9	N
Total Nitrogen	mg/L	--	0.3	76 ²	0.3	--	9.4	--	7.6	Y
Total Phosphorus	mg/L	--	0.03	0.22	0.01	--	9.4	--	0.03	Y
Iron, Total Recoverable	µg/L	--	1000	890	105	--	4.5	--	248	N
Chromium, Total Recoverable	µg/L	--	100	3	<1	--	4.5	--	1.4	N
Nickel, Total Recoverable	µg/L	261	29	93	<2	0.45	4.5	65	19	N
Zinc, Total Recoverable	µg/L	67	67	110	<5	0.45	4.5	77	24	Y

¹ Chronic/Human Health criterion for ammonia is based on nonsignificance (15% of the ammonia standards based on updated ambient data).
² C_d for Total Nitrogen based on Total Inorganic Nitrogen concentration as summarized in **Table 3.C**

Table 4.B Reasonable Potential Analysis for Outfall 002 to Ground Water

Parameter	Units	Acute Water Quality Standard (S_a)	Non-Degradation Criterion (S_N)	Critical Effluent Conc. (C_d)	Critical Background Receiving Water Conc. (C_s)	Acute Dilution Factor (D_a)	Chronic Dilution Factor (D_c)	Projected Receiving Water Conc. Acute (C_{Ra})	Projected Receiving Water Conc. Nondeg. (C_{RN})	WQBEL Needed Based on RPA?
Nitrate + Nitrite	mg/L	--	1.5	32	0.13	--	0.8	--	18	Y
Iron, Total Recoverable	µg/L	--	400	890	30	--	0.8	--	541	Y
Chromium, Total Recoverable	µg/L	--	15	3	< 1	--	0.8	--	2.1	N
Nickel, Total Recoverable	µg/L	261	4.4	93	< 2	0.08	0.8	86	53	Y
Zinc, Total Recoverable	µg/L	67	10	110	< 8	0.08	0.8	102	65	Y

APPENDIX 5—WASTE LOAD ALLOCATIONS (WLA) AND EFFLUENT LIMITATIONS

Water quality-based limitations (WQBEL) are based on procedures described in EPA's *Technical Support Document for Water Quality Based Toxic Control*, EPA/505/2-90-001, March 1991 (TSD) with minor modifications to accommodate the specific requirements of Montana's water quality standards. WQBEL must accommodate the magnitude, duration and frequency components of the standards, accounting for any mixing zone, and not allow an exceedance of these standards when stream flows equal or exceed the design flows specified in ARM 17.30.635. The mass balance equation discussed in Appendix 4 and **Section 2.2.8** is used to determine if WQBEL are necessary.

The mass-balance equation is arranged to calculate the effluent concentration or WLA that does not exceed the instream target as follows:

$$WLA = S + D(S - C_s)$$

Where:

WLA	=	waste load allocation (C_d in the mass-balance equation)
S	=	applicable water quality standard, or nondegradation criterion (S_n)
D	=	acute (D_a) or chronic (D_c) dilution ratio at critical effluent flow
C_s	=	receiving water pollutant concentration (background).

The WLA is then translated into an effluent limitation depending on the type of standard. These procedures are described below. WLAs are expressed in units of concentration. Values for the applicable standards and background concentrations are given in Appendix 1 and 2, respectively. Mixing zones and dilution ratios are given in **Section 2.2.7**.

The background concentration affects the determination of the WLA for both new and existing sources. For existing sources where the background concentration as measured by the 75th percentile ($C_{.75}$) exceeds the applicable water quality standard (S), the WLA is set at the standard ($WLA = S$) and no mixing zone is granted. For new sources discharging to high quality water, the background concentration may already exceed the nondegradation criterion (S_n). In order to protect existing water quality, no increase above background concentration is allowed without an authorization to degrade. The process for assigning a WLA is summarized in **Table 5.A**.

Table 5.A Determination of WLA with respect to background concentration

New Source – High Quality Receiving Water, Nondegradation-based WLA	
$S_n < C_s < S$	No increase above background allowed; Set $WLA = C_s$; No dilution ($D = 0$)
$S_n < S < C_s$	No assimilative capacity; ARM 17.30.1311(7); Set $WLA = S$ No dilution ($D = 0$)
Existing Source – Nondegradation Does Not Apply	
$S < C_s$	No assimilative capacity; No dilution ($D = 0$); Set $WLA = S$

PROCEDURES FOR TRANSLATING WLA INTO PERMIT LIMITATIONS

Aquatic Life Effluent Limitations: In most cases, there are two aquatic life WLAs, namely a WLA based on the acute aquatic life standard (WLA_a) and a WLA based on the chronic aquatic life standard (WLA_c). For each of these WLAs, there is a corresponding long-term average effluent concentration (LTA) calculated by multiplying the WLA by a factor (WLA multiplier). This multiplier is a statistically-based factor derived from the ratio of the WLA, set at a specific percentile value, to the LTA. The value of the multiplier varies depending on the coefficient of variation (CV) of the data set, the percentile value for the WLA (e.g., 99th percentile), and whether the WLA is based on an acute (1-hour average) or chronic (4-day average) water quality standard. The WLA is set at the 99th percentile of the lognormal distribution. The equations for the WLA multipliers (WLA multiplier_{acute99}, WLA multiplier_{chronic99}) and the corresponding LTAs are shown below:

$$\begin{aligned} \text{WLA multiplier}_{\text{acute99}} &= \text{EXP} (0.5\sigma^2 - z\sigma) \\ \text{WLA multiplier}_{\text{chronic99}} &= \text{EXP} (0.5\sigma_4^2 - z\sigma_4) \end{aligned}$$

Where

σ = standard deviation

$$\sigma = [\ln(\text{CV}^2 + 1)]^{0.5}$$

$$\sigma^2 = \ln(\text{CV}^2 + 1)$$

$$\sigma_4 = [\ln((\text{CV}^2/4) + 1)]^{0.5}$$

$$\sigma_4^2 = \ln((\text{CV}^2/4) + 1)$$

$z = 2.326$ for 99th percentile probability basis

$$\text{LTA}_a = \text{WLA}_a * \text{WLA multiplier}_{\text{acute99}}$$

$$\text{LTA}_c = \text{WLA}_c * \text{WLA multiplier}_{\text{chronic99}}$$

Because the calculated LTAs do not have different averaging periods, they can be directly compared to select the most protective aquatic life LTA. This WLA is the basis for calculating effluent limitations that protect aquatic life from both acute and chronic effects. The corresponding CV used in the RPA is used for calculating the aquatic life WLAs. Calculated acute and chronic LTAs are provided below.

The two aquatic life LTAs, acute and chronic, represent two performance levels that the Facility would need to maintain. By comparing the two LTAs and selecting the minimum LTA as the basis for the calculated WQBELs, the procedure ensures that the AML and MDL are based on a single performance level that will protect against both acute and chronic effects.

$$\text{LTA}_m = \text{Minimum of LTA}_a \text{ and LTA}_c$$

Effluent limitations for protection of aquatic life are calculated by multiplying the most protective aquatic life LTA by multipliers, which are based on the lognormal distribution. Each multiplier is a statistically-based factor reflects the relationship between the LTA and the effluent limitations. The value of the multiplier for each effluent limitation varies depending on:

- the **probability basis** of the effluent limitation (i.e., the percentile value on the lognormal distribution of effluent pollutant concentrations where the limitation will be set, such as 95th percentile or 99th percentile);
- the **CV** of the data set; and
- the **number of samples** (for the AML) that will be averaged in order to measure compliance with the effluent limitation.

The AML and MDL multipliers are based on the following:

- setting the AML at a 95th percentile occurrence probability and the MDL at a 99th percentile occurrence probability; these probability bases are consistent with EPA's recommendations in the TSD and consistent with the probability bases EPA uses to derive technology-based requirements in the effluent guidelines;
- the CV used in the reasonable potential determination or a default CV of 0.6 if a CV cannot be calculated; and
- the actual monthly sampling frequency that will be required in the permit, unless the planned sampling frequency is one time per month or less; if the sampling frequency that will be specified in the permit is one time per month or less, DEQ uses a value for sampling frequency (n) in the formula for calculating the AML that is greater than one. This procedure assumes a sampling frequency of two to four times per month in order to ensure that the AML will not exceed any of the calculated WLAs, as recommended in EPA's TSD (pp. 107-108).

The formulae for calculating the AML and the MDL from the most protective aquatic life LTA are shown below:

$$\text{AML}_{\text{aquatic life}} = \text{LTA} \times \text{AML}_{\text{multiplier95}}$$

$$\text{MDL}_{\text{aquatic life}} = \text{LTA} \times \text{MDL}_{\text{multiplier99}}$$

$$\text{AML}_{\text{multiplier95}} = e^{(z\sigma_n - 0.5\sigma_n^2)}$$

Where:

$$\sigma_n = [\ln(\text{CV}^2/n) + 1]^{0.5}$$

$$\sigma_n^2 = \ln((\text{CV}^2/n) + 1)$$

z = 1.645 for 95th percentile probability basis

n = number of samples per month that will be required in the permit

$$\text{MDL}_{\text{multiplier99}} = e^{(z\sigma - 0.5\sigma^2)}$$

Where:

$$\sigma_n = [\ln(\text{CV}^2 + 1)]^{0.5}$$

$$\sigma_n^2 = \ln(\text{CV}^2 + 1)$$

z = 2.326 for 99th percentile probability basis

Some aquatic life water quality standards are expressed as a single numeric value that defines a single acceptable level of effluent quality; consequently there will be only a single corresponding WLA. The following procedure applies:

- Consider the single WLA to be WLA_c ;
- Using the CV determined in the reasonable potential analysis, calculate an LTA that will allow the effluent to meet WLA_c using the equations for the chronic WLA above; and
- Derive an AML and MDL based on the LTA and CV using the equations above.

Human Health Effluent Limitations: Montana's numeric human health numeric standards are expressed as values that may not be exceeded in the receiving water. Because of this requirement, it is necessary to set human health effluent limitations that meet a given WLA on a daily basis. DEQ uses the following approach to establish the effluent limitations for protection of human health:

For parameters where the HHS is the limiting standard, the AML is set equal to the WLA_h , as stated in TSD Section 5.4.4. However in accordance with Circular DEQ-7 Footnote 16, receiving water "concentrations may not exceed" any HHS, so the MDL is also set at the WLA_h .

FINAL WQBEL

The final WQBELs for a given parameter are determined as follows:

- For **discharges not subject to nondegradation criteria**, the AML and MDL calculated from the aquatic life standards are compared to the AML and MDL calculated from human health standards. The lowest AML and the lowest MDL are the final calculated WQBELs because the lowest of each of these limitations will assure attainment of both the aquatic life and human health standards.
- For **discharges subject to nondegradation criteria**, the AML and MDL calculated from the acute water quality standard and the more restrictive of the chronic nondegradation-based standard and the human health nondegradation criterion. The AML and MDL are the final calculated WQBELs because the lowest of each of these limitations will assure attainment of the applicable nondegradation criteria.

Permittees who are unable to comply with a WQBEL based on a nondegradation criterion may submit an authorization to degrade state waters under ARM 17.30.706.

The calculated WQBELs for these outfall(s) must be compared to TBELs for the same parameter to determine the final permit effluent limitations that meet the requirements of Section 301 of the federal Clean Water Act (CWA). This stringency analysis and anti-backsliding considerations are discussed in **Section 2.3** of the permit fact sheet.

Outfall 001 to the East Boulder River

Table 5.A summarizes the pertinent calculations and WQBEL for Outfall 001. WQBEL were calculated for all pollutants that are regulated by TBEL (cadmium, copper, lead, mercury and zinc) and those non-TBEL pollutants in the effluent that were found to have potential to exceed the respective standards. WQBELs were based on protection of the East Boulder River, and were calculated using the applicable methodology described in this section and the dilution ratios discussed in Section 2.2 and summarized in Tables 4.A.1 and 4.A.2. The following specific assumptions were made:

- *Mercury*: the previous permit did not develop an effluent limit for mercury, which is subject to the federal ELG, and requires an effluent limit that is the most stringent of the TBEL or WQBEL. Mercury is a toxic with a bioconcentration factor (BCF) of >300. As a new or increased source (constructed after 1993), the nonsignificance value for mercury is therefore no greater than background (ARM 17.30.715(b)). The background concentration of mercury is “undetermined” since the four (4) samples provided were all nondetect. Therefore, the WLA was set at the detection limit (0.005µg/L). This level is one-tenth of the human health standard and will maintain the existing background concentration of the receiving water is maintained.
- *Ammonia*: the Facility has provided updated ambient data to allow for an improved determination of the applicable water quality standard for East Boulder River. DEQ based the WQBEL development in this Appendix on nonsignificance of these newly calculated standards.
- *TN and TP*: Effluent limits were calculated for total nitrogen and phosphorus for comparative purposes. The Permittee has requested a variance from these limits. The nutrient variance is discussed in **Section 2.2** of the fact sheet and will be incorporated into the final effluent limitations. The background concentration of total nitrogen exceeded the water quality nondegradation standard, therefore the WLA was set at the standard.

The WQBELs developed in this appendix for Outfall 001 will be compared against the nonsignificance levels developed in the 2000 Permit and the most stringent will be maintained.

Outfall 002 to Ground Water

Table 5.B summarizes the pertinent calculations and WQBEL for Outfall 002. WQBEL were calculated for all pollutants that are regulated by TBEL and those non-TBEL pollutants in the effluent that were found to have potential to exceed the respective nondegradation-based standard. Effluent limits were based on protection of the East Boulder River after mixing with ground water. Dilution ratios were based on ground water dilution. No surface water dilution was allowed. WQBEL were not calculated for total nitrogen, total phosphorus, or ammonia since the total nitrogen load limit from the previous permit will be maintained. This limit is based on protection of ground and surface water and is further discussed in **Section 2.2**.

All WLAs for metal parameters discharged through Outfall 002 were based on attaining compliance with the nonsignificance criteria in ARM 17.30.715 for aquatic life and human health standards in the East Boulder River. Ground water standards were not considered since the effluent discharges to the surface water. Effluent limitations based on surface water human health and aquatic life standards are at least as protective as ground water standards.

Table 5.B WQBEL for Outfall 002 to Ground Water

Pollutants	Units	Acute Water Quality Standard	Chronic Non-Degradation Criterion	Acute Wasteload Allocation	Chronic Wasteload Allocation	Minimum Wasteload Allocation	Average Monthly Limit (AML)	Maximum Daily Limit (MDL)	Comment
Nitrate+Nitrite	mg/L	--	1.5	--	2.6	2.6	2.6	3.8	--
Iron, Total Recoverable	µg/L	--	400	--	696	696	696	1,016	--
Cadmium, Total Recoverable	µg/L	1.05	0.024	1.05	0.024	0.024	0.024	0.035	C _s undetermined; Set WLA=S _N
Copper, Total Recoverable	µg/L	7.3	0.78	7.3	0.78	0.78	0.78	1.14	C _s undetermined; Set WLA=S _N
Lead, Total Recoverable	µg/L	34	0.195	34	0.195	0.195	0.195	0.285	C _s undetermined; Set WLA=S _N
Mercury, Total Recoverable	µg/L	1.7	0.005	1.7	0.005	0.005	0.005	0.005	C _s undetermined; Set WLA=S _N
Nickel, Total Recoverable	µg/L	261	4.35	282	6.2	6.2	6.2	9.1	--
Zinc, Total Recoverable	µg/L	67	10	72	12	12	12	17	--